State ownership and corporate social responsibility: the role of the institutional environment

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Abstract

This thesis explores the implications of state ownership on ESG pillar scores across 69 countries in 2002-2019. I find that state ownership is associated with higher responsibility on all three constituents of ESG individually on average. By introducing a selection control following Heckman (1976) and by comparing state-owned enterprises (SOEs) to a propensity score matched control group, I document that selection of SOEs can explain more than half of the premium in environmental and social pillar scores, and completely in governance score.

I also explore characteristics of the domestic institutional environment that may shape the relationship of interest: while accountability of government as measured with V-Dem polyarchy score predicts a positive relationship between state ownership and firm-level environmental and social, but not governance responsibility, it does not seem to be a definitive element of the institutional environment in shaping the relationship. However, becoming an SOE as defined with a minimum 5% state ownership appears to be followed by improvement in environmental and social pillar scores, but only in democratic countries. Pillar scores are not sensitive to conversely defined ceasing to be an SOE.

Importantly, when the government or its citizens have demonstrated an interest in environmental protection via regulation or values, SOEs in their portfolio tend to have higher environmental performance, controlling for several country and firm-level characteristics. Other variables of the institutional environment I explore include minority investor protection, corruption, degree of politicization, and legal origin.

Keywords state ownership, ESG, institutional environment

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Tiivistelmä

Tämä tutkielma tarkastelee valtio-omistuksen merkitystä yritysvastuun (ESG) suhteen 69 maassa vuosina 2002-2019. Valtio-omistukseen liittyy keskimäärin korkeampi vastuullisuus kaikilla ESG:n kolmella osatekijällä mitattuna. Sekä lisäämällä valikointikontrollimuuttujan regressiomalliin Heckmanin (1976) mukaisesti että vertaamalla valtio-omisteisia yrityksiä propensity score matching -menetelmällä valittuihin kontrolliyrityksiin, osoitan että valtionyritysten valikointi voi selittää yli puolet ympäristö- ja sosiaalisen vastuun preemiosta sekä koko preemion hallintotavan vastuullisuudessa.

Tutkin myös sellaisia maakohtaisen institutionaalisen ympäristön muuttujia, jotka saattavat muovata riippuvuussuhdetta valtio-omistuksen ja vastuullisuuden välillä: vaikka hallinnon vastuunalaisuus kansalaisille V-Dem polyarchy-arvolla mitattuna ennustaa positiivista suhdetta yrityskohtaisen valtio-omistuksen ja ympäristö- ja sosiaalisen muttei hallintotavan, vastuullisuuden välillä, se ei näytä olevan yrityksen institutionaalissa ympäristössä määräävä tekijä mielenkiinnon kohteena olevan riippuvuussuhteen kannalta. Kuitenkin, valtion omistusosuuden kasvamista vähintään viiteen prosenttiin näyttää seuraavan ympäristö- ja sosiaalisen vastuun kasvaminen ainoastaan demokraattisissa maissa. Vastuullisuusmittarit eivät reagoi päinvastaisesti määriteltyyn valtio-omistuksen lakkaamiseen.

Huomionarvoista on, että kun hallinto tai kansalaiset maan hallinto tai sen kansalaiset asettavat ympäristönsuojelulle suuren painoarvon lainsäädännöllä tai keskimääräisillä ympäristöarvoilla mitattuna, valtio-omisteisuuteenkin liittyy korkeampi vastuullisuus luonnon ja ympäristön suhteen, ottaen huomioon useita valtio- ja yritystason muuttujia. Muut institutionaalisen ympäristön muuttujat, joita tarkastelen, ovat vähemmistöomistajien suoja, korruptio, virkamiesnimitysten politisoituneisuus ja oikeudellinen järjestelmä.

Avainsanat valtio-omistus, ESG, institutionaalinen ympäristö

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1 Introduction

"We've just together committed to an energy and climate strategy, the Paris Agreement, and the UN Sustainable Development Goals. And what does the state's own energy company do? Invests billions into fossil energy production."

Finnish MP Sirpa Paatero, 2017

The remark by former Finnish Minister of Ownership Steering (Demokraatti, 2017) combines two phenomena on the rise in the financial markets: state ownership and responsibility. Increasingly, investors are considering the environmental, social, and governance (ESG) responsibility of their portfolios – in 2020, global assets under management of signatories to the Principles for Responsible Investment exceeded 100 trillion US dollars (UNPRI, 2021). In the meantime, state ownership has made a resurgence (Bruton et al., 2015; The Economist, 2010) and a transformation from complete state control of strategic assets to partial 'hybrid' ownership through sovereign wealth funds, for example. With multiple objectives often being mentioned as the fundamental issue of state ownership (Megginson and Netter, 2001; Shleifer and Vishny, 1994; Vickers and Yarrow, 1991), the two expanding phenomena beg the question of how states influence ESG policies of their portfolio companies.

In recent years, some empirical studies have emerged to start filling the research gap in corporate responsibility implications of ownership. For example, institutional investors have been documented to export their domestic values in the form of environmental and social responsibility (Dyck, Lins, et al., 2019). With relation to state ownership, Hsu et al. (2021) exhibit in a recent working paper that state-owned enterprises (SOEs) from countries with high energy risk and impairments in environmental regulation are associated with high environmental engagement. Deficiencies of the current literature relate to the question of causality and the role of surrounding institutions, as I will later present.

In this thesis, I discuss state ownership and motivations for ESG investment in light of agency theory (Jensen and Meckling, 1976), which describes challenges

in the interest alignment of principals and their agents. Agency theory applies not only to the relationship between managers and owners of the firm but also to the relationship between politicians and citizens, both fundamental to the topic of this study. Using institutional mechanisms that might cause variation in these relationships, I empirically explore circumstances in which the state might have both the willingness and the ability to promote environmental and social performance of partly-owned companies in excess of what is preferred by minority investors.

More specifically, I focus on how the institutional environment is related to the objectives of politicians and state bureaucrats in terms of corporate ESG. The reasoning begins from an assumption that firms behaving environmentally and socially responsibly, but not as much in terms of governance, is in the interest of individuals globally. The chain through which citizens' preferences reflect to SOEs goes through elected politicians and state officials, and is therefore subject to several elements of the surrounding institutional environment. My main hypothesis is that when state representatives are accountable to citizens, SOEs will be associated with abnormally high environmental and social performance, because state representatives have to cater to the demand by voters and civil society.

To measure ESG performance of companies, I use Refinitiv ESG pillar scores (Refinitiv, 2021). The pillar scores aggregate more than 500 measures of responsibility for up to nearly 9,000 companies worldwide in environmental, social, and governance responsibility separately. I combine ownership and other firm-level data from Refinitiv Eikon and Datastream to create a yearly panel data set for examining how ESG pillar scores respond to the level of and changes in state ownership. In the final data set, there are 56,432 firm-year observations in 69 countries for the period 2002-2019.

I augment the data set with a series of variables related to country-level institutional environment. As the main characteristic solidifying the E&S (environmental and social) impact channel from citizens to SOEs, I proxy government accountability with the V-Dem polyarchy score for each country-year observation. The polyarchy score measures for example freedoms of association and expression, and fairness of elections. I also use alternative proxies for government accountability in robustness

checks. Other metrics of the institutional environment that I explore include the degree of politicization of nominations of senior bureaucrats, corruption, minority investor protection, and legal origin. Furthermore, I collect proxies of governments' and citizens' preferences in terms of the importance of environmental protection to show how they are reflected in SOEs actions.

Previous literature on the relationship between state ownership and corporate ESG profiles has attempted to single out engagement from selection by using natural experiments, which either focus on specific industries (Hsu et al. (2021): nuclear and emission-intensive industries, Liang and Renneboog (2020): oil & gas and car manufacturing) or use shocks that are hardly exogenous (Hsu et al. (2021): government orientation to left vs. right). Moreover, no natural experiment has acknowledged the institutional environment in the relationship. Therefore, without a natural experiment suited for a more general causal interpretation thus far, I use alternative methods to advance current literature on the topics of causality and the role of institutions in it. I address the question of correlation vs. causality using methods that are to my knowledge unique in the literature on state ownership and ESG: controlling for selection of SOEs following Heckman (1976), tracking successive changes in state ownership and ESG, and using propensity score matching to find suitable control companies. This thesis is also the first to make a distinction between transparency-related and 'hard' ESG with relation to state ownership.

I also contribute to the literature on state ownership and ESG (e.g. Bai et al. (2006), Hsu et al. (2021), and Liang and Renneboog (2020)) by examining how the institutional environment might shape the relationship. While Hsu et al. (2021) study differences between countries by energy dependence, I continue exploring the role of the institutional environment by including democracy, politicization, investor protection, corruption, legal environment, and environmental preferences. I largely focus on accountability of government, motivated by variation in objectives of state representatives under different levels of democracy (Shleifer, 1998).

I document a positive overall correlation between state ownership and all three constituents of ESG individually while Hsu et al. (2021) reported a positive relation

with environmental and social responsibility, but not governance. Using differences-in-differences regressions for democratic and autocratic country SOEs and POEs, and a control variable for the selection of SOEs following Heckman (1976), the association remains positive and significant only in democratic regimes. The addition of a selection control reduced the SOE effect by about half for environmental and social performance, and by two thirds on governance, which in fact lost statistical significance completely. These findings are largely robust to the ownership data and cutoff used.

When the sample is split to four based on the level of democracy, the results get more ambiguous, implying that government accountability as measured by democracy is not necessarily a very powerful explanatory variable of the shape of state ownership in terms of pillar scores. The results also suggest that higher E&S performance in democracies is primarily driven by domestic government agencies, a finding consistent with those of Hsu et al. (2021) who document no effect by SWFs or foreign state-owners. The positive effect found for foreign SWFs in baseline tests is swallowed by the Norwegian Government Pension Fund Global when it is treated as separate from other foreign SWFs in robustness checks.

Examining changes in state ownership and pillar scores, I find evidence of increases in environmental and social performance following increases in state ownership, again only in democratic countries. This result suggests that causality is also involved in the relationship of interest. In autocratic countries, no changes in pillar scores are documented subsequent to increases in state holdings. Purchases of stakes held by the state are also not associated with significant changes to either direction in either regime type.

When state-owners are classified based on their country of incorporation government's environmental preferences (proxied with the Environmental Policy Stringency Index[1] and having a net zero carbon target in place or under discussion), only state

[1]I use the Environmental Policy Stringency Index and not the Environmental Performance Index, applied e.g. by Dyck, Lins, et al. (2019), to give larger weight to regulation, as it reflects government preferences more cleanly than for example conditions preordained by geography that also influence environmental performance. Governments can also more quickly steer regulation according to their preferences than they are able to influence health of the local environment. The

ownership by high-environmental-interest countries is reflected in a higher environmental performance. A similar result is found with interests of citizens aggregated from responses to a World Values Survey question in which priority is given to either the environment or the economy. Citizen interests have a correlation below 0.4 with both government preference variables. Moreover, these patterns seem not to be a feature of domestic state ownership alone. My findings are qualitatively very close to those of Dyck, Lins, et al. (2019), who examine ownership by institutional investors, such as pension funds and investment advisors, in a similar way. Importantly, they are also conflicting with Hsu et al. (2021)'s result that state ownership has a positive relation with environmental engagement only in countries where *negative* changes in environmental regulation have occurred, albeit they use classification by countries of incorporation, and I by countries of owners. This inconsistency highlights the value of studies acknowledging ownership type as well as the gravity of cross-border state ownership.

Propensity score matching (PSM) is used to compare SOEs to otherwise similar privately-owned enterprises (POEs). That is, I use firm-level observable characteristics to estimate all firms' propensity to be an SOE in a given year, and then limit the control sample to POEs that match closest to an SOE's propensity. The results from this approach provide further support for a causal effect on E&S, but not governance, to the extent that the PSM model appropriately simulates selection. However, I find no significant differences in democratic and autocratic country SOE effect on pillar scores with differences-in-differences with to the PSM control group. This is contrary to my finding of increases in E&S after becoming an SOE in democracies only.

Results from tests exploring more characteristics of the institutional environment mostly yield relatively obscure results. Perceived degree of politicization does appear to positively influence the correlation between state ownership and pillar scores in Europe. Introducing investor protection or corruption together with democracy produce mixed results in terms of pillar scores. Subsampling the data according

EPS index has been used by for example De Haas and Popov (2019) to study country-level CO_2 emissions in a working paper and Martínez-Zarzoso et al. (2019) on innovation and productivity. The EPI is applied, however, is a robustness check.

to legal origin of countries shows considerable differences in the shape of state ownership. High correlations between institutional variables is likely to be among factors confounding the results.

Finally, I find that democratic country SOEs more often positively and significantly stand out from democratic country POEs and autocratic country SOEs when the dependent variable is a reporting, transparency, or policy-related responsibility variable than a 'hard' variable, such as emission reduction or waste recycling. Autocratic country state ownership, on the other hand, is documented to be associated with lower levels of female employees and managers, less reporting, and less anti-takeover devices.

The rest of the thesis continues as follows: Section 2 summarizes prior literature of both state ownership and ESG investment, and discusses how the two elements act together. In Sections 3 and 4, I present the data and methodologies used. Results are presented and discussed in Section 5. Section 6 shows results from additional robustness checks. Section 7 concludes.

2 Literature review

2.1 State ownership

In this section, I start by describing the history of state ownership briefly, followed by a discussion on how agency issues and potential for political usage shadow state ownership of companies. I continue by illustrating how accountability of government and bureaucrats may affect environmental, social, and governance actions of SOEs. Finally, I summarize the empirical literature on state ownership and how the institutional environment shapes it.

2.1.1 The rise, the fall, and rise again of state ownership

The modern history of state ownership can be broadly separated into three phases: first, the rise of its popularity, even among economists (Shleifer, 1998), during the period following the Second World War, followed by an enormous wave of privatizations starting in the 1980s, and finally the new rise of state ownership in the form of hybrid organizations, which are partly state- and partly privately-owned (Bruton et al., 2015). The history of state ownership is useful in understanding the purposes for which it has been used both in the past and the present.

According to Shleifer (1998), the initial popularity of state ownership was not only a result of WWII, but also of the failure of relatively free competition during the Great Depression and of Soviet industrialization's seeming success. Indeed, the discussion of private vs. state ownership was closely related to that of capitalism vs. socialism. State ownership was, and largely still is, viewed as a policy tool to tackle market imperfections, as well as to promote the state's role in so-called strategic industries. Subsequently, state control was high in industries where natural monopolies are typical, where major externalities arise, and in the provision of public goods. These include for example telecommunication, rail and air transportation, and postal services, while industries deemed strategic include e.g. steel, defense, and banking. In the developing world, state ownership was also used as a growth promoter.

Although the government of West Germany had experimented with a few offerings of SOEs in the 1960s, the starting of privatization is, probably rightly so, attributed to Margaret Thatcher's government (Megginson and Netter, 2001) in the UK. The following two decades saw major privatization programs all over the world, from Western Europe to Latin America, Africa, Asia, and former Soviet Union. Motivations for privatization included raising revenue for the state, and promoting competition, private share ownership, national capital markets, and economic efficiency, as well as reducing government interference (Megginson and Netter, 2001).

The discussion of private vs. government ownership has traditionally revolved around a binary classification, while during the 21st century, partly state-owned 'hybrid organizations' have increased their significance in global economic activity (Bruton et al., 2015; The Economist, 2010). Furthermore, the state as an owner often has other goals besides financial success: for example, foreign state acquirers tend to come from autocratic countries interested in diversifying their industrial structure (Karolyi and Liao, 2017), state-owned companies like to hold on to excess employment (Bai et al., 2006; Shleifer and Vishny, 1994), and governments use ownership as a policy tool (Megginson and Netter, 2001). Subsequently, studies of modern state capitalism should account for not only a broader range of ownership models but also of outcome variables to acknowledge the existence of multiple objectives.

A key characteristic of modern state ownership is the major presence of sovereign wealth funds. Examples of such funds are the Norwegian Government Pension Fund Global, China Investment Corporation, Temasek Holdings (Singapore), and Australian Future Fund. SWFs are typically described as being further away from the political objectives of the state than ownership through for example government agencies (Liang and Renneboog, 2020). SWFs also have characteristics of institutional ownership such as high diversification and long-term focus. Therefore, it is valuable to recognize potential differences in ownership through different state vehicles.

2.1.2 Agency and the political use of state ownership

Agency theory (Jensen and Meckling, 1976) discusses the issues and solutions related to the separation of ownership (principal) and control (agent) of the firm. The theory relies on incentives created for managers of the firm to work or not to work for the best interest of the shareholders of the company. Shleifer and Vishny (1986) present that having a large shareholder may mitigate the issue considerably due to having the incentive to monitor the management as opposed to the case of widely dispersed ownership. Without any blockholders, the cost of monitoring can be overbearing compared to the achievable benefits for an individual minority owner.

However, in a latter paper Shleifer and Vishny (1997) discuss some of the issues of having large owners. In addition to diversification and risk-related asymmetry, the issues regard the blockholder being able to expropriate minority shareholders either straightforwardly or by promoting personal, non-profit-maximizing goals. Dyck and Zingales (2004) documented a number of institutional factors, such as development of capital markets and diffusion of media, to be related to the value of private benefits of control. Shleifer and Vishny (1997) specifically claim that the state is an inefficient owner partly due to the fact that bureaucrats hold concentrated control rights but insignificant cashflow rights. Hence, state officials are not incentivized to work or monitor as efficiently. Furthermore, state officials and politicians may be able to consume private benefits, such as gain votes, via the control of SOEs. The mismatch in incentives of government (representatives) and minority shareholders is often claimed to be the fundamental issue of state ownership (Megginson and Netter, 2001; Shleifer and Vishny, 1994; Vickers and Yarrow, 1991).

The incentives of politicians and government officials, on the other hand, are certainly not uniform. First of all, the ability of state representatives to reap private benefits has considerable distortions across institutional environments (D'Souza and Nash, 2017). For example, Shleifer (1998) argued that in democratic regimes, politicians may use SOEs to channel their resources in a way that maximizes votes, and in autocratic countries in a way that maintains loyalists. In China, which is a notable state-owner, SOE managers are claimed to often be more interested in

leveraging their companies to gain senior government positions rather than profit or wealth maximization (Hung et al., 2012; Jiang and Kim, 2015). Privatization, too, can be used to a pursue political agendas through e.g. patronage and distributional decisions (Dinc and Gupta, 2011; Vickers and Yarrow, 1991).

2.1.3 Government and bureaucrat accountability

This thesis explores the relationship between state ownership and corporate social responsibility across different institutional environments. I expect that if the preferences of citizens are generally reflected in the government's actions, environmental and social performance of SOEs are better. However, this implies a chain of signalled preferences and demands from citizens to politicians to bureaucrats to state-owned enterprises. Moreover, the argument assumes that citizens and voters prefer companies to have high environmental and social performance.

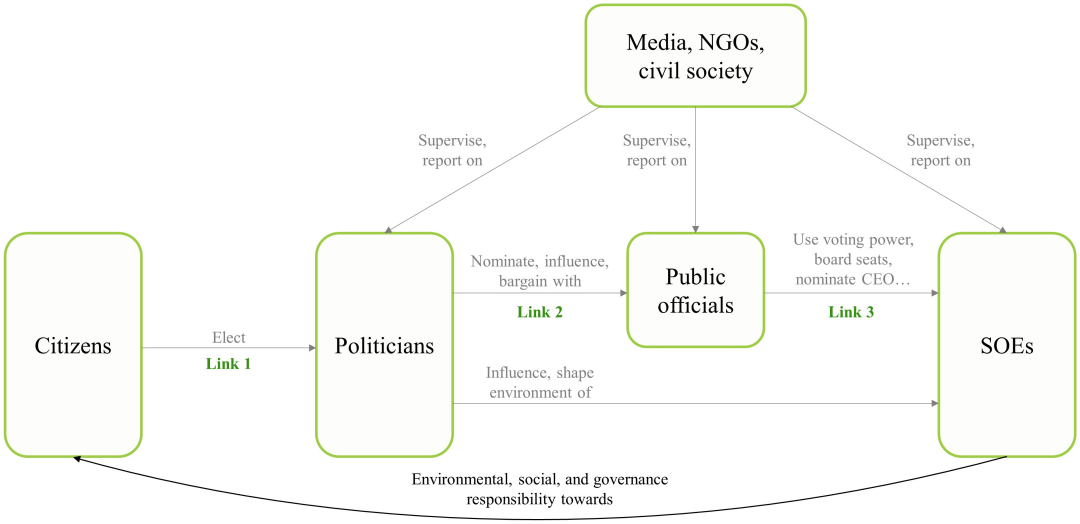

Figure 1: Chain from citizens to SOE responsibility

This figure illustrates the chain through which citizens' preferences potentially shape ESG decisions of SOEs. The institutional environment affects strength of each relationship or link. Numbered links are the ones I mostly explore in the thesis.

The first link in the chain illustrated in Figure 1, where citizens reward and punish politicians based on their actions, provides the setting for the focal point in this thesis. In democratic regimes, government accountability is high, and politicians

need to respond to citizens' demands whereas in autocratic regimes already the first link is loose. Moreover, the political system has to be competitive for checks on the government to be effective (Beck et al., 2001).

In the second link, politicians try to persuade bureaucrats to conform their actions to politicians' preferences, while bureaucrats maximize their own utility (Niskanen, 1975). I expect the link to be stronger when politicians have more say in nominations of government officials, and when influencing officials helps their electoral prospects (Raffler, 2018).

The final link, where bureaucrats affect the management of SOEs is a function of at least corruption, minority investor protection, and overall legal environment. If investor protection is strong and corruption low, bureaucrats and politicians have less capacity to extract private benefits through resource allocation decisions of SOEs (Baum et al., 2019; Dyck and Zingales, 2004).

Finally, the media, non-governmental organizations, and civil society overall are present in all relationships and directly or indirectly affect other elements of the institutional environment.

A key assumption, which I will also relax in one set of tests, is that citizens generally prefer environmentally and socially responsible behavior by firms. However, whether this preference is reflected in their voting patterns, is subject to question. Vickers and Yarrow (1991) note that usually SOE performance is not very high in political discussions but does gain visibility around e.g. plant closures and major financial losses. Moreover, with ambiguity in the decision-making of politicians, i.e. when multiple actors are involved, voters have a hard time signalling their preferences through elections (Martin and Raffler, 2021), even if they include SOE actions.

Another question is whether specifically the ESG actions of SOEs matter for voters, politicians, and bureaucrats. Maskin and Tirole (2004) argue that accountability of government increases potential for 'pandering' – serving public opinion instead of making the best choices maximizing societal welfare. Environmental and social actions of SOEs act as a potential avenue for serving the public opinion by, for example, maintaining excess employment or committing to a radically fast energy transition.

Ashworth (2012) states that short-term outcomes and information are key features of electoral accountability. As the amount of ESG related information has risen globally, ambiguity in responsibility has decreased, making it increasingly easier to incorporate ESG in civil engagement and voting preferences. While environmental and social improvement often take time and patience, there is also room for potentially favorable short-term outcomes (to the state representative), such as building a plant close to the incumbent's home district instead of abroad, or simply improving reporting and transparency. Be it out of personal interest, to gain popularity, or some other reason, US presidents from Democratic and Republican parties have urged CSR behaviour from companies (Margolis and Walsh, 2003) already prior to the ESG breakthrough.

2.1.4 State ownership: empirical findings

The privatization wave that started in Thatcher's UK in the 1980s has served as the primary research avenue for literature of state ownership. Thus, it mostly focuses on financial and economic efficiency of wholly state-owned enterprises vs. wholly privately-owned enterprises (POEs). It has been reviewed by e.g. Megginson and Netter (2001), who document that while there is considerable variance in results because of different institutional environments and methods of privatization, the general pattern appears to be improvement in efficiency and profitability along with private ownership. Dewenter and Malatesta (2001) found private ownership to be associated with higher profitability, and lower labor intensity and leverage. Further, they identified profitability improvements already prior to privatization date, which suggests that pruning has often been involved. Another result suggesting ownership to be an effective corporate governance mechanism is that when postprivatization private ownership is concentrated, firm performance is also higher (Boubakri, Cosset, and Guedhami, 2005). The effect is stronger when investor protection is low, suggesting that ownership concentration can substitute for strong institutions. More recently, the results of a meta-analytical study by Tihanyi et al. (2019) lean on a negative relationship between state ownership and performance, as well as large differences in

strategies of SOEs and POEs[2].

Privatization initial public offerings (PIPOs) tend to be more underpriced, and to underperform benchmarks in the long run (Megginson and Netter, 2001). The institutional environment and political purposes explain a large part of the considerable heterogeneity in underpricing (Dewenter and Malatesta, 1997; Jones et al., 1999). However, the financial effects of privatization are difficult to capture due to trouble finding suitable benchmarks for privatized companies, selection in which companies to privatize first, pruning companies for sale, and simultaneous reforms.

State ownership is, especially today, often associated with developing countries (Estrin and Pelletier, 2018). Boubakri and Cosset (1998) recognized that developing country PIPOs typically happen in small capital markets simultaneously with other major reforms. Developing country PIPOs also tend to be gradual, and not pure exits. The authors found improvements in profitability, efficiency, employment level, investment, sales, and dividends. Estrin and Pelletier (2018) show that successful privatization in terms of improved performance in developing countries needs strong supporting institutions. Interestingly, Boubakri, El Ghoul, et al. (2018) found that in the period 2006-2010 in East-Asia, government ownership appeared to be valuable to firms when the stake was less than 50%, especially if capital markets were underdeveloped and legal institutions developed.

The institutional environment has considerable effects on the state's actions as a shareholder. For example, corruption has been shown to have a considerable negative impact on financial performance of SOEs (Baum et al., 2019). During the financial crisis, European government ownership was accompanied with defused reductions in firm value but only in countries where corruption was low and investor protection high (Beuselinck et al., 2017). Similarly, D'Souza and Nash (2017) found that SOEs have a smaller likelihood to cross-list in the US, if the prevailing environment allows easier extraction of private benefits. Another study regarding listing decisions documented that firms which were close to then-president Suharto in Indonesia were

[2]The question of government ownership and economic efficiency is highly politicized. Subsequently, a meta-analytical approach might indicate academic preconception rather than robust scientific consensus.

less likely to list abroad and access foreign financing (Leuz and Oberholzer-Gee, 2006), suggesting that firms well-positioned to benefit from corruption had an advantage in loan conditions domestically.

The magnitude of state ownership in China as well as its unique institutional setting and corporate governance structure deserve a discussion on their own. For example, Jiang and Kim (2015) claim that incentive pay, which is readily rare, has a weak link on SOE performance because promotion to a high-level government position is a stronger incentive for managers. This is consistent with the finding that politically connected Chinese SOEs were more likely to list in Hong Kong (Hung et al., 2012): listing in Hong Kong was accompanied with a weaker long-run performance than domestic listing, more media coverage for managers, and higher probability of promotion to a senior government office. Chinese SOEs have traditionally been used to maintain social stability and as a policy tool, which is evidenced by them holding excess employment (Bai et al., 2006). Wang and Qian (2011) also documented that privately-owned Chinese companies had more to gain from corporate philanthropy, as they attempted to build valuable political connections.

Closely related to state ownership literature are studies of politically connected companies. The two domains are similar in the sense that senior management have relatively high-powered incentives outside the corporate world, as well as connections to public entities. Political connections have been found valuable in positive stock market reactions to large owners or top officers entering politics (Faccio, 2006), to offer easier access to financing (Chaney et al., 2011), to provide a higher probability of being bailed out (Faccio et al., 2006), and to cause negative stock market reactions to adverse health news regarding a known political ally (Suharto in Indonesia) (Fisman, 2001). On the other hand, politically connected French firms and plants supported employment in order to boost incumbent regional politician's likelihood to win, especially around tight elections without an observed return on this investment (Bertrand et al., 2018). Chinese politically connected firms *underperformed* non-connected recently privatized companies in several financial measures, supporting the notion of a unique institutional setting in the country (Fan et al., 2007).

Based on this summary, state ownership appears to be shaped by the interests of government representatives. Furthermore, government representatives have widely dispersed incentives, and widely dispersed abilities to pursue their interests via the SOEs where they are involved. Therefore, a meaningful study of global state ownership has to account for the heterogeneity in institutional environments where SOEs operate.

2.2 ESG investment

This section will begin by describing the meaning and role of ESG. An overview of motivations for ESG investment follows. The last two subsections summarize the empirical literature on ownership and ESG, first with relation to the state, and then to other types of owners.

2.2.1 ESG and role of the firm

ESG refers to the initials of environmental, social, and (corporate) governance responsibility. As a concept, ESG has to some extent taken the place of CSR, which refers to corporate social responsibility. CSR literature mostly focuses on the environmental and social aspects of responsibility, and in this thesis when I use the term CSR, I refer to the first two components of ESG.

Academic discussion on CSR has largely revolved around its effect on and relation to financial performance. According to Margolis and Walsh (2003), the first studies on this relationship came in the 1970s partly as a response to Milton Friedman's critique in 1970 of firms pursuing other-than-profit goals. The authors found 127 studies empirically examining CSR and financial performance jointly. A manifest of CSR and ESG's rise in academic relevance, Friede et al. (2015) identified more than 2000 such studies only 12 years later. Both papers point to a positive relationship between the variables often perceived to be in conflict[3]. Still, be the relationship positive, negative, or neutral, a causal link is much more difficult to establish than

[3]As in the case of state ownership and financial performance, meta-analyses and review papers might aggregate academic preconception more than anything else.

correlation, and is probably highly dependent on contingencies.

Discussions on the role of the firm are also closely related to ESG, as Margolis and Walsh (2003) present. Historically, social causes have been seen as the (elected) government's, not firms', job. However, roles get more complicated when the state is a shareholder among others. Margolis and Walsh (2003) also note that while literature focuses on how CSR affects the firm, scholars tend to disregard the question of whether CSR or corporate philanthropy is effective from a societal welfare perspective. In addition, Hart and Zingales (2017) propose that instead of focusing on shareholder *wealth*, attention should move towards shareholder *welfare*. This view makes discussions on the effect of ESG on financial performance less meaningful and establishes ESG as potentially valuable for shareholders on its own. To aggregate shareholders' interests, the authors advocate voting on corporate policy.

2.2.2 Why corporations invest in ESG

A major part of finance literature related to ESG and CSR assess whether or not engaging in these practices is financially valuable to the firm. The question remains without a definitive answer, as the answer is likely highly dependent on context. Still, it is useful to look at what causes firms to engage in responsible business and charitable practices. There have been numerous proposals in academic literature, and I will next present some that have gained popularity as well as discuss how the state as a shareholder can be reckoned with these theories.

Bénabou and Tirole (2010) propose three perspectives on CSR engagement. The first is a win-win situation, where managers invest in CSR practices they estimate to carry positive net present value. In the delegated philanthropy perspective, shareholders deliberately use the firm to promote social causes that are valuable to them. Insider-initiated philanthropy occurs when image-seeking managers incur a cost to shareholders to derive private benefits via CSR. Delegated philanthropy is closely related to stakeholder theory, while insider-initiated philanthropy is aligned with agency theory. Delegated and insider-initiated are plausibly pronounced in SOEs, as the state, politicians, and bureaucrats indeed have multiple objectives

which can be served through companies under their influence (Shleifer and Vishny, 1994; Vickers and Yarrow, 1991), and they bear little of the costs related to CSR investments.

In a similar vein as insider-initiated philanthropy of Bénabou and Tirole (2010), Barnea and A. Rubin (2010) propose a 'warm-glow' or a good global citizenship motive for CSR engagement. They posit that the relationship between CSR and financial performance is concave, i.e. profitable only up to a point. Therefore, 'warm-glow' induces insiders who have little ownership to over-invest in CSR, especially if they are affiliated with the firm. State ownership is often well-known by investors, consumers, and citizens alike, and affiliation subsequently high. This yields a prediction that when decision-makers derive benefit from good global citizenship, perhaps in the form of votes, nomination to more senior positions, or simply by reputation, they over-invest in CSR. However, it must be noted that affiliation may indeed be low if there are several layers of decision-making within the state organization.

Institutional context matters for ESG motives too. For example, Campbell (2007) discusses how general economic conditions, regulation, institutionalized norms, and the presence of NGOs, among others, explain how firms engage in responsible behaviour. Kang and Moon (2012) argue that in liberal market economies CSR is predominantly competitive while in coordinated market economies, CSR motivations have a large socially cohesive component too. The authors also present that in state-led market economies there has been a major shift from developmental to competitive CSR. Aguilera et al. (2006) discuss how instrumental (profit-seeking), relational (social pressure, legitimization), and moral motivations can explain differences in CSR practices in the US and UK, two major liberal market economies. Furthermore, Di Giuli and Kostovetsky (2014) find that when US company top management is Democratic-leaning, firms invest more in CSR practices, which I interpret to be supportive of agency problems. They find a similar pattern for companies headquartered in Democratic states, explainable by stakeholder theory and conflict-resolution hypotheses (Dam and Scholtens, 2012; Jo and Harjoto, 2012). Another example of individual characteristics affecting CSR policy is CEOs with first-born daughters

devoting more to responsibility, especially diversity (Cronqvist and Yu, 2017).

I will discuss how ownership structure has been documented to be related to ESG decisions in the next section. Before that, I demonstrate with an example how the large literature on ownership and firm-level outcome variables can be applied to ESG decisions. Shleifer and Vishny (1986) argue that having a large shareholder can mitigate issues arising from the separation of ownership and control because large shareholders not only have the ability to affect decisions with their voting power but also the incentive to monitor management. Small individual investors alone are unlikely to have benefits exceed the costs of actively monitoring the management. Similarly, even if a large part of investors are mindful of ESG matters, actively promoting ESG investment with a small stake in the company may not be worth the cost for the individual. Thus, a large shareholder mindful of ESG matters is more likely to find shareholder activism worthwhile. However, large shareholders and non-aligned objectives with small shareholders potentially brings about expropriation of minor shareholders (Dyck and Zingales, 2004; Shleifer and Vishny, 1997). In this thesis, I generally explore circumstances in which state representatives may find CSR privately beneficial over and above the extent to which other shareholders do.

Literature of motives for investment in corporate governance is much less developed than on environmental and social responsibility, i.e. CSR. Governance is often used as an independent variable on studies of financial performance (e.g. Bebchuk et al. (2009)) and CSR (e.g. Aguilera et al. (2006)). Corporate governance concerns for example mechanisms that prevent management from pursuing private benefits at the expense of shareholders: CEOs can expropriate situations when ownership is passive and scarce (Schmidt and Fahlenbrach, 2017) whereas investors with limited capital are likely to prefer firms with high quality governance. Another aspect of corporate governance is 'horizontal' where minority investors are protected from controlling shareholders' expropriation (Dyck and Zingales, 2004). Thus, when the state has a large stake, it may not be incentivized to improve corporate governance. However, this problem is well-known, and for example the OECD (2015) urges high quality corporate governance from SOEs.

2.2.3 State ownership and ESG: empirical findings

The field of state ownership and ESG decisions in varying institutional contexts is largely uncharted. Among the 12 studies reviewed by Jain and Jamali (2016)[4], most have single-country data (five times China, four times some other), and the effect of state ownership in particular is often only a side-product of some other focus area by inclusion as a control variable. Nevertheless, the authors document mostly a positive relationship between state ownership and ESG, although some papers reported a negative one.

Some studies have, however, explored the environmental footprint of state ownership while taking into account differences in institutional environment: in a recent working paper, Hsu et al. (2021) explore a number of factors that may affect the state using SOEs as a policy tool in environmental matters. State ownership, using a 25% cutoff, is found to be associated with higher environmental responsibility in countries with higher energy risk, and in countries with a decrease in environmental regulation. They also report that neither SWFs nor foreign state-owners affect environmental scores to any direction. Furthermore, environmental improvement is documented following the Fukushima nuclear disaster and severe weather conditions in most affected industries, as well as when the government becomes more left-leaning, suggesting a causal impact. The same effects are not found for governance scores while there appears to be a milder effect to the same direction on social responsibility. On the other hand, Liang and Renneboog (2020) show that SWFs do incorporate ESG in selection of target companies when they are based in developed countries or countries that have civil law origins. In line with Hsu et al. (2021), they do not find evidence of causality among sovereign wealth funds, emphasizing the importance of both addressing selection and acknowledging state-owner characteristics.

The extent of state control in partly privatized Chinese companies has provided a fruitful ground for research on this topic. For example, mayoral changes have been shown to be followed by politically motivated CSR investments by small and private

[4]The paper (Jain and Jamali, 2016) focuses on the effect of corporate governance on CSR. State ownership only is a small part in this paper too.

firms (Lin et al., 2015). The authors posit this is because CSR spending is a way to establish valuable political ties to the newly appointed local government for private firms, whereas SOEs are readily connected. Using employment as a mechanism to maintain social stability, Chinese SOEs tend to provide excess jobs (Bai et al., 2006). Less professional boards in SOEs have been documented both in China, where SOE boards are also older and have less women (Fan et al., 2007), and in Europe, where the civil law governmental holdings are associated with considerably better corporate governance than common law SOEs (Borisova et al., 2012).

2.2.4 Ownership, agency, and ESG: empirical findings

Agency issues' effect on ESG outcomes vary with managers, shareholders, or other strong stakeholders' ability to pursue private benefits with a firm's resources. A relatively robust finding among this literature is that firms tend to decrease spending on ESG matters when insider ownership increases (Barnea and A. Rubin, 2010; Dam and Scholtens, 2012; Oh et al., 2011). Cheng et al. (2013) and Masulis and Reza (2015) use the 2003 Dividend Tax Cut in the US as an exogenous shock affecting managers' interest alignment with shareholders. They expect and find the increased opportunity cost of ESG investment to negatively affect corporate social responsibility, evidence supportive of considerable agency problems within top management. Similarly, family ownership is reported to be negatively related to ESG by Rees and Rodionova (2015), who attribute this finding to family owners' typically low diversification and the assumption that ESG investment has a negative effect on financial performance at the margin.

Institutional investors, on the other hand, appear to be major drivers of corporate social responsibility globally. Oh et al. (2011) show that foreign ownership is also positively related to ESG in Korea. Furthermore, Dyck, Lins, et al. (2019) specifically find that it is foreign institutional investors who contribute positively to ESG scores even in the US, but only when they come from countries where corporate social responsibility is deemed important. Interestingly, they present that this apparently causal effect is mainly driven via private engagements rather than shareholders

proposals. This finding is important in the light of this thesis, as the state in the role of a shareholder can be in an even stronger negotiating position due to its ability to positively or negatively effect a company's or its management's environment. The extent to which states can affect company engagements through shareholder proposals is plausibly quite similar to that in institutional owners.

To summarize the literature review, I will present some predictions derived from previous literature. First, I expect that in democratic countries state ownership will be associated with an increased environmental and social performance compared to privately-owned companies whereas I expect no difference in autocratic countries (see definitions in Section 3.2). The condensed reasoning for the prediction is that overall, I assume citizens to benefit from environmental and social responsibility of firms but only in democratic countries can citizens hold state decision-makers accountable for their actions in promoting or lagging on CSR. I assume citizens to be less sensitive to responsibility of corporate governance, and I expect a neutral effect at best in both democratic and autocratic countries. I anticipate any positive effect on CSR to be primarily driven by domestic state-owners as citizens are presumably more watchful of companies' actions in their home country. Moreover, government agencies being more subject to political agendas than SWFs, I hypothesize any effect on ESG by state ownership to be primarily driven by the former.

3 Data

3.1 Company data

The primary source for ownership data in this thesis is Refinitiv Eikon. The main advantage of the source is its classification of all available shareholders by for example type and country of origin. However, it also comes with several limitations. First of all, Eikon only provides ownership information in the first layer of the ownership pyramid. For example, when the Indonesian government transferred its 66% stake in coal company Bukit Asam to the government-owned company INALUM, Eikon ceased to recognize Bukit Asam as an SOE. Second, quite often data is simply missing, although when ESG-data become available for a firm, the quality of its ownership data in Eikon is also better. Still, I try to mitigate this issue by only considering companies whose total percent of available holdings is at least 10%. For an illustration of ownership availability see Figure A1. Thirdly, Eikon only reports shares in free-float, and provides no data for closely-held shares. A final issue is that the total percent of shares available in data is above 100 in nearly 9% of firm-year observations. The same source is used for the institutional ownership control variable, which has been documented to positively affect CSR (Dyck, Lins, et al., 2019).

I use state ownership data both as a continuous variable and to create a binary classification of SOEs. The definition of an SOE I most often use is that a minimum of five percent of shares are held by domestic and foreign SWFs and government agencies in total. Conversely, I define privately-owned enterprises (POEs) as having less state ownership than the cutoff. Typically, studies define SOEs as having a minimum of 50% of shares in state control while for example Hsu et al. (2021) require 25%. The argument for such high cutoffs is dominant control. To incorporate modern hybrid ownership (Bruton et al., 2015), I apply a lower cutoff that still enables exerting influence in corporate decision-making. In robustness checks I use other cutoffs of ownership. I also explore type and country of origin of ownership in several specifications. However, categorizations of state-owner type contain some errors, which makes methods reliant on this data somewhat tenuous.

Refinitiv is also used for data on ESG performance. Starting in 2002 with about 600 companies, the data set has grown to represent above 70% of global market cap (Refinitiv, 2021). Refinitiv uses over 500 measures to create yearly ESG scores. The geographical composition of the data can be explored in Table A1. Primarily, I use the Environmental (E), Social (S), and Governance (G) pillar scores as dependent variables throughout the thesis. Pillar scores are constructed of single data points, which are weighted according to their importance in the underlying TRBC industry group. Pillar scores are then normalized across the industry median to a range from 0 to 100. In case of the G score, all industries have the same weights in data points, and normalization is done in countries, not industries. The same database, formerly know as Thomson Reuters ASSET4, is widely used in ESG research (e.g. Dyck, Lins, et al. (2019) and Hsu et al. (2021)).

There are some issues related to ESG data from Refinitiv as well. Studying the effects of the institutional environment, large biases towards single countries can confound results considerably. Indeed, the US represents a large share of the data used but there are few SOEs in the country that would bias results for state ownership effects. Another issue is Refinitiv assigning zero for E score if reporting has been insufficient. While it is plausible that companies which report inadequately are not best-in-class in environmental conduct, a score of zero likely doesn't reflect true performance. Both these issues are addressed in robustness checks.

Other variables on the ESG performance of companies are specific data points from Refinitiv, which I classify as either reporting, transparency, and policy-oriented or 'hard' variables. This is done to identify if any ESG effects of state ownership are driven by simply increased transparency. Hard metrics used include total energy use, share of renewable energy, CO_2 emissions, waste recycling ratio, the share of female employees and managers, net employment changes, number of anti-takeover devices, and share of independent board members. Used reporting, transparency, and policy variables are the scope of ESG reporting, and binary variables for publishing a sustainability report, and having health and safety, emission reduction, and shareholder rights policies.

Table 1: Descriptive statistics

This table reports summary statistics of firm-year observations of main variables in the thesis. Ownership data and firm controls are from Eikon. Pillar scores and ESG variables are from Refinitiv. V-Dem polyarchy is from Coppedge et al. (2020). Investor protection is the Strength of Minority Investor Protection from World Bank. Anti-corruption is the Corruption Perceptions Index from Transparency International. GDP per capita is retrieved from the World Bank. Variables marked with (w) are winsorized yearly at the 2.5th and the 97.5th percentiles.

Statistic	N	Mean	St. Dev.	Min	25%	Median	75%	Max
Ownership								
State total %	56,432	3.38	10.46	0.00	0.23	0.82	1.61	103.33
Domestic GA	56,432	1.65	8.98	0.00	0.00	0.00	0.00	99.90
Domestic SWF	56,432	0.64	4.55	0.00	0.00	0.00	0.04	100.00
Foreign GA	56,432	0.06	1.20	0.00	0.00	0.00	0.00	72.65
Foreign SWF	56,432	1.03	2.15	0.00	0.12	0.62	1.20	70.60
Institutions (w)	56,432	44.98	31.21	1.22	17.61	37.14	73.41	107.03
Total available (w)	56,432	69.41	23.15	13.76	52.28	71.50	87.31	117.74
Pillar scores								
Environmental	56,432	32.71	29.10	0.00	3.23	27.50	57.19	99.25
Social	56,432	42.10	23.43	0.05	23.40	39.52	59.57	98.97
Governance	56,432	48.75	22.53	0.11	30.57	49.04	66.80	99.35
Institutions								
V-Dem polyarchy	56,432	0.78	0.21	0.02	0.82	0.86	0.89	0.92
Investor protection	32,320	35.02	4.40	14.00	32.00	35.00	37.00	45.00
Anti-corruption	35,747	68.13	15.39	20.00	62.00	74.00	77.00	92.00
Log(GDP/capita)	56,432	10.42	0.80	6.69	10.42	10.69	10.91	11.69
Firm controls								
Total assets m$ (w)	56,432	21,467	50,372	64	1,603	4,660	14,941	526,607
Return-on-assets (w)	56,432	5.25	8.57	−45.02	1.83	5.01	9.11	29.47
Debt-to-equity (w)	56,432	100.17	135.42	0.00	19.33	55.94	117.66	992.22
Price-to-book (w)	56,432	2.79	2.70	−0.001	1.15	1.90	3.32	16.13
ESG variables								
Log(Energy use) (w)	22,155	14.91	2.34	0.00	13.31	14.85	16.51	20.55
Log(CO_2 total) (w)	26,083	12.55	2.46	5.99	10.91	12.47	14.20	18.43
Renewables ratio (w)	4,507	20.63	24.65	0.001	1.68	9.80	31.58	95.94
Waste rec. ratio (w)	13,021	62.84	28.84	0.38	41.72	68.98	88.00	99.96
Women managers % (w)	16,079	25.92	14.75	0.60	15.00	24.00	35.45	65.00
Women empl. % (w)	24,108	34.71	17.58	6.00	20.00	33.00	48.68	74.14
Empl. creation (w)	50,254	5.35	15.24	−31.00	−2.00	2.00	9.00	69.10
Anti-takeover (w)	56,008	2.74	2.72	0.00	0.00	2.00	4.00	9.00
Board indep. (w)	53,804	57.59	26.73	0.00	37.50	61.54	81.25	100.00
ESG rep. scope (w)	24,107	90.09	21.73	11.88	99.00	100.00	100.00	100.00
Sust. reporting	56,430	0.51	0.50	0.00	0.00	1.00	1.00	1.00
Policies								
Emissions	56,367	0.52	0.50	0.00	0.00	1.00	1.00	1.00
Health & safety	56,147	0.70	0.46	0.00	0.00	1.00	1.00	1.00
Shareholders	56,008	0.85	0.35	0.00	1.00	1.00	1.00	1.00

Firm-level control variables, also from Refinitiv, include debt-to-equity, market-to-book, total assets, and return-on-assets. On these variables, as well as continuous unrestricted dependent variables such as energy use and net employment change I

perform winsorization. That is, for each year separately, I pull observations below (above) the 2.5th (97.5th) percentile to the 2.5th (97.5th) percentile. This is done in order to limit the effect of outliers.

The available ESG, ownership, and control variable data produce a data set of 56,432 firm-year observations over the period of 2002-2019 for ESG pillar scores and the period 2001-2018 for ownership and control data. 5,165 of the observations are SOEs using the 5% ownership cutoff as definition. The data spans as many as 69 countries of incorporation, 58 of which have at least one SOE observation. See Appendix A for more detailed information about the country, industry group, and yearly composition of the data as well as a breakdown of average levels of key variables for SOEs and POEs separately.

Table 2: Pairwise correlations

This table reports pairwise correlations for firm-year observations of main variables in the thesis. The variables are the percentage of shares held by state entities and institutions, the percentage of shares for which there is ownership information in the data, ESG pillar scores, V-Dem polyarchy score, log of GDP per capita in countries of incorporation, log of total assets, return-on-assets, debt-to-equity ratio, and price-to-book ratio. Variables Inst., % in data, Assets, Roa, D/E, and P/B are winsorized at the 2.5th and 97.5th percentiles yearly.

	State %	Inst.	% in data	Env	Soc	Gov	Dem.	GDP	Assets	Roa	D/E	P/B
State %	1											
Inst.	-0.204	1										
% in data	0.032	0.620	1									
Env	0.100	-0.109	-0.143	1								
Soc	0.104	0.071	0.013	0.711	1							
Gov	0.050	0.055	-0.069	0.393	0.405	1						
V-Dem	-0.207	0.404	0.037	0.066	0.139	0.012	1					
GDP	-0.225	0.434	0.064	-0.024	0.019	-0.007	0.588	1				
Assets	0.108	-0.090	-0.155	0.263	0.261	0.195	-0.016	-0.011	1			
ROA	0.018	-0.011	0.057	0.071	0.045	0.063	-0.061	-0.122	-0.094	1		
D/E	0.031	-0.019	-0.038	0.082	0.083	0.048	0.005	-0.033	0.356	-0.120	1	
P/B	-0.063	0.154	0.185	-0.088	0.021	-0.040	0.028	0.007	-0.137	0.212	0.083	1

3.2 Institutional environment data

I explore several factors related to the institutional environment that potentially affect the shape of state ownership in a country. Accountability of government or democracy is measured yearly with the V-Dem (Coppedge et al., 2020) polyarchy score which takes the scale of 0 to 1 and is available for all necessary years. The polyarchy score

considers freedoms of association and expression, free and fair elections, and suffrage, all crucial elements in determining a country's citizens' ability to hold government representatives accountable for their actions. However, democracy ratings are not interchangeable (Cheibub et al., 2010), so I perform robustness checks with the Economist Intelligence Unit's Democracy Index (available from 2006) and the V-Dem accountability index.

In some specifications democracy is measured as a continuous variable, but mostly I use a binary classification that allows for differences-in-differences testing. In binary classifications, democracies are defined as having at least a 0.5 V-Dem polyarchy score, a value which is very close to the median of countries. Autocracies are defined as the opposite. However, it must be noted that countries just above or below the cutoff cannot be rightfully compared as a democracy and an autocracy – these definitions are mostly used in text for brevity. In addition, countries such as Thailand and Turkey are above the cutoff in some years, and below it in other years in methodologies that use annual democracy data. I also test different cutoffs in robustness checks.

In several tests, I control for the natural logarithm of (lagged) GDP per capita in the home country. This data is retrieved from the World Bank and is available for all countries.

To identify how the interests of either a country's citizens or government are reflected in the form of state ownership, I obtain some measures to be used as proxies of those interests. Citizens' preferences between sustainability and economic growth are measured with data from the World Values Survey. I use the average of three waves of surveys[5] for the whole period, as the effect of values on economic outcomes can be quite persistent (Alesina et al., 2013; Dyck, Lins, et al., 2019). Governments' revealed preferences are measured with two sets of data: the Environmental Policy Stringency (EPS) Index by OECD (Botta and Koźluk, 2014) and whether or not the country had a net zero carbon target (NZT) in place or under discussion at

[5]In WVS waves 5, 6, and 7 the corresponding questions are V104, V81, and Q111. Respondents choose one of two statements that place priority to protecting the environment over economic growth and jobs or the other way around.

the end of 2019[6]. The EPS index is available from the beginning of the data series in 2001 to 2012 for 33 countries and until 2015 for 16 countries. From the end of data availability, I use the latest EPS index value. I transform WVS and EPS to binary variables based on the country being above or below median. Subsequently, countries that have a net-zero target and are above median in EPS are described as their government being attentive to environmental matters. Similarly, if WVS for a country is above median, citizens signal demand for corporate environmental engagement.

In Section 2.1.3, I argued that if politicians strongly influence nominations of state officials, the chain from citizens' demand to CSR is stronger. To measure this influence, I use a degree of politicization measure constructed from the large COCOPS Executive Survey on Public Sector Reform in Europe (Hammerschmid, 2015). For the 16 European countries, I take the average of senior bureaucrats' responses on a scale of 1 to 7 to the statement that "politicians regularly influence senior-level appointments in my organisation"[7]. If a country scores high on this degree of politicization measure, I expect the effect of state ownership on CSR to be stronger.

Minority investor protection, corruption, and legal origin are also potential characteristics of the institutional environment shaping state ownership. If investor protection is high, and corruption is low, state officials have less capacity to pursue private benefits through SOEs. Legal origin, which simplifies country-level legal traditions according to their background such as English common law and Scandinavian civil law, has been shown to be related to a number of financial outcomes (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998). I use the Strength of Minority Investor Protection Index (MPI) by the World Bank, starting in 2013 with the DB15-20 methodology and the Corruption Perceptions Index (CPI) by Transparency International, starting in 2012. For legal origin, I use classifications

[6]This information has been collected from the Energy & Climate Intelligence Unit's Net Zero Tracker using the Wayback Machine from https://web.archive.org/web/20191219181449/https://eciu.net/netzerotracker

[7]For a discussion of the scope of the survey, see Bach et al. (2020).

from La Porta, Lopez-de-Silanes, and Shleifer (2002). MPI and CPI are available for all countries in the relevant data, and legal origin is only missing for five countries, which represent a minimal share of the data.

Table 3: Pairwise correlations of institutional variables

This table reports pairwise correlations for country-level institutional variables during the latest year in the data. The second column indicates the year used for calculating correlations. Variables are V-Dem polyarchy, V-Dem government accountability, EIU democracy, degree of politicization (POL), Strength of Minority Protection Index (MPI), Corruption Perceptions Index (CPI), Environmental Protection Stringency Index (EPS) and World Values Survey WVS, Net Zero (carbon) Target, and GDP per capita. See Section 3.2 for more detail.

	Year	V-Dem Poly	V-Dem Acc	EIU Dem	POL	MPI	CPI	EPS	WVS	NZT	GDP/ capita
V-Dem Poly	2018	1									
V-Dem Acc	2018	0.965	1								
EIU Dem	2018	0.926	0.925	1							
POL	Multi	−0.099	−0.153	−0.437	1						
MPI	2018	0.064	0.087	0.129	−0.214	1					
CPI	2018	0.533	0.542	0.667	−0.542	0.066	1				
EPS	Multi	0.522	0.519	0.618	−0.461	−0.028	0.815	1			
WVS	Multi	0.238	0.198	0.350	−0.199	−0.113	0.255	0.367	1		
NZT	2019	0.569	0.570	0.573	0.012	−0.052	0.508	0.532	0.390	1	
GDP/cap	2018	0.420	0.402	0.534	−0.536	−0.001	0.840	0.679	0.288	0.447	1

4 Methodology

The basis for testing my predictions is to explore differences in the relationship between state ownership and ESG pillar scores under varying institutional environments. Most tests rely on a differences-in-differences regression with fixed effects but other methods are also used. For example, I exploit changes in state ownership to try to identify signals of causality. Propensity score matching is applied to more rigorously control for the selection of state ownership. In several specifications, to account for more than one institutional environment variable, I split the data into brackets, most often based on the level of democracy.

Baseline regression

The baseline differences-in-differences regression is as follows:

$$\begin{aligned} Pillar_{i,t} = \beta_0 &+ \beta_1 SOE_{i,t-1} AUT_{c,t-1} + \beta_2 SOE_{i,t-1} + \beta_3 AUT_{c,t-1} \\ &+ \beta_4 Size_{i,t-1} + \beta_5 P/B_{i,t-1} + \beta_6 ROA_{i,t-1} + \beta_7 D/E_{i,t-1} \\ &+ \beta_8 Mills_{i,t-1} + \beta_9 GDP_{c,t-1} + \beta_{10} Inst_{i,t-1} + \Lambda + \epsilon_{i,t} \end{aligned} \tag{1}$$

The variables of interest are $SOE_{i,t-1}$, which equals to 1 if the company i is state-owned in year $t-1$ and 0 otherwise, $AUT_{c,t-1}$, which equals to 1 if the company's home country c was autocratic in year $t-1$ and 0 otherwise, and their interaction. $Pillar_{i,t}$ is Environmental, Social, or Governance pillar of company i in year t. $Size$, P/B, ROA, and D/E are the log of total assets in millions of dollars, price-to-book, return-on-assets, and debt-to-equity in $t-1$. $Mills$ is the inverse Mills ratio, a variable used to control for selection following Heckman (1976). The selection equation is displayed in Model 2. GDP is the log of GDP per capita in $t-1$, also used by Dyck, Lins, et al. (2019) and Hsu et al. (2021). $Inst$ is the percentage of shares held by institutions. In the original data, SWFs are also categorized as institutional owners, so I have subtracted SWF ownership from $Inst$. Λ indicates fixed effects. Year fixed effects are included in all panel regressions, industry group fixed effects are added to regressions in which the dependent variable is governance

pillar score. This is because E and S are readily balanced by industry group while G is balanced by country. Country fixed effects are added only to regressions where institutional environment variables are excluded due to their high mutual correlation. ϵ is the error term.

The selection equation used to create inverse Mills ratios (Heckman, 1976) is below. The equation estimates the observable characteristic-based propensity to be an SOE in a given year:

$$\begin{aligned} SOE_{i,t-1} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 P/B_{i,t-1} + \beta_3 ROA_{i,t-1} + \beta_4 D/E_{i,t-1} \\ + \Sigma\rho * Country_i + \Sigma\delta * Ind_i + \Sigma\gamma * Year_t + \epsilon_{i,t} \end{aligned} \tag{2}$$

SOE, $Size$, P/B, ROA, and D/E are as in Model 1. $Country$, Ind, and $Year$ are country, industry, and year fixed effects.

In another baseline model, I split the sample into four brackets based on V-Dem polyarchy scores, and use the total percentages held by domestic and foreign SWFs and government agencies as the variables of interest. Using continuous variables overcomes the issue of companies with barely 5% and above 50% being treated similarly. The methodology also helps in identifying the types of state ownership that drive pillar scores. Splitting the sample into brackets allows different loadings on also other variables in the model under different levels of democracy. The democracy bracket cutoffs are 0.25, 0.5, and 0.75 in raw V-Dem polyarchy score. The sample is strongly weighted towards democratic countries (the 25th percentile of V-Dem polyarchy score is 0.82). Thus, using quartiles, i.e. four equal size brackets, of the sample instead would have lead to the top three quartiles being essentially very similar in terms of the institutional environment variable of interest. The model is presented below:

$$\begin{aligned} Pillar_{i,t} = \beta_0 + \beta_1 \text{ D-GA}_{i,t-1} + \beta_2 \text{ D-SWF}_{i,t-1} + \beta_3 \text{ F-GA}_{i,t-1} + \beta_4 \text{ F-SWF}_{i,t-1} \\ + \beta_5 Size_{i,t-1} + \beta_6 P/B_{i,t-1} + \beta_7 ROA_{i,t-1} + \beta_8 D/E_{i,t-1} \\ + \beta_9 GDP_{c,t-1} + \beta_{10} Inst_{i,t-1} + \Lambda + \epsilon_{i,t} \end{aligned} \tag{3}$$

In the four variables of interest marking an ownership percentage in the top row, D indicates domestic, F foreign, GA government agencies, and SWF sovereign wealth funds. The rest of the variables are as in Model 1.

Changes in state ownership

In the second set of tests, I exploit changes in state ownership. I first identify purchases and sales of SOEs based on changes in total percent of shares held by states between consecutive years. Becoming an SOE (purchase) is defined as the state total stake increasing from less than 2% in year $t-1$ to at least 5% in year t. Conversely, ceasing to be an SOE (sale) is defined as the share decreasing from at least 5% to less than 2%. I use the minimum information cutoff of 10% discussed in Section 3.1 for both years.

For purchase and sale events separately, I look for a propensity score matched (Rosenbaum and D. B. Rubin, 1983) control company. This means that I estimate the propensity to become or cease to be an SOE for all companies based on observable characteristics that potentially explain changes in state ownership. To add plausibility, I require exact matching based on country and year. However, requiring exact matching on some characteristic may cause matching based on other variables to be relatively weak, i.e. it increases the curse of dimensionality. The right-hand-side variables in the PSM model are the same as in Model 2, and the left-hand-side variable is 1 if a purchase or sale event is identified, depending on the model, and 0 otherwise.

Based on the estimated propensities, I match each treatment company purchased or sold by state entities to one control company. Then, I use a generalised difference-in-differences regression with dynamic treatment effects to identify average differences between the treatment companies and control companies from three years prior to the event until three years after the event. This estimation is done separately for companies from democratic and autocratic countries, which are defined in this test based on their average polyarchy score during 2001-2018 using a cutoff of 0.5. Performing the estimation for seven years in total for each company will allow to

identify pre-trends before the event, which can potentially explain if SOE selection explains differences in pillar scores or if there is a causal effect from changes in state ownership status. The role of propensity score matching is to allow focusing on the implications of state ownership on pillar scores that is *not* explained by the state selecting certain types of companies to invest in.

I employ a first-differences regression as an alternative method to identify the effect of changes in state ownership on changes in pillar scores. The regression is otherwise similar to Model 3 but instead of absolute values, changes from $t-1$ to t are used on the left-hand-side and from $t-2$ to $t-1$ on the right-hand-side. In addition, I summarize all state ownership into one continuous variable, i.e. total state ownership. Naturally, fixed effects are not used in this specification.

Both methods that use changes in state ownership are subject to limitations related to data consistency discussed in Section 3.1. Therefore, results should be interpreted with caution.

Propensity score matching

The third set of tests compares SOEs to a control group of propensity score matched (PSM) POEs in 2019. As a difference to the previous methodology, I do not focus here on changes in ownership but simply the level of ownership in a single year. In the matching procedure, I require exact matching on country[8]. To increase the quality of matching within countries, I also require that there are at least double the amount of POEs as SOEs for a country to be included in the data. Then, I calculate the average differences-in-differences for SOEs and POEs in democracies and autocracies and present the results. I continue with the same data and PSM model, and present visually the average SOE pillar scores for each country as well as average differences to the PSM matched control group. I include the democracy rating of each country in the x-axis. However, I include only countries with at least three SOEs to make sure country-level results are not driven by single observations.

[8]Considering the increased scale of foreign state ownership (Karolyi and Liao, 2017), this isn't necessarily a mandatory restriction.

Ideally, this minimum cutoff would be much higher but increasing it would weaken the diversity of countries significantly. The PSM model is detailed below:

$$SOE_{i,2018} = \beta_0 + \beta_1 Size_{i,2018} + \beta_2 P/B_{i,2018} + \beta_3 ROA_{i,2018} + \beta_4 D/E_{i,2018} + \Sigma\rho * Country_i + \Sigma\delta * Ind_i + \epsilon_{i,t} \quad (4)$$

SOE, $Size$, P/B, ROA, and D/E are as in Model 1. $Country$ and Ind are country and industry fixed effects. Exact matching on country is required to make the control group more plausible.

Interest categorization

I move on to grouping state-owners based on observable interest proxies of both government and citizens. Government interest is first proxied by the Environmental Policy Stringency (EPS) Index. The idea is that if a government has enforced stringent environmental regulation, it has an interest to improve environmental performance and therefore is more likely to weight environmental responsibility heavily in the companies in which it is a shareholder. In the same way, citizens' values are proxied by World Values Survey (WVS) results on the relative importance of the environment and the economy. With both proxies, I calculate the firm-year total state ownership by countries above or below the median in these measures. With EPS, the median is calculated yearly whereas a permanent categorization is used with WVS. In these tests, the only dependent variable is environmental pillar, as the interest proxies are related to the environmental aspect of CSR.

I use a similar approach with another proxy for government interests by categorizing state-owners based on them having or not having a net zero carbon target (NZT) in place or under discussion at the end of 2019. However, this test is limited to one year of data due to NZTs only having become popular quite recently. I also introduce a carbon intensity measure as a dependent variable in this test, as the interest proxy is directly related to carbon intensity of firms. Carbon intensity is measured as total CO_2 emissions divided by the book value of assets. In all these tests, I first use all owners based on the categorizations and in a separate regression

include only domestic owners based on the categorizations, and control for total foreign state ownership. The two types of models are presented below:

$$\begin{aligned} Env_{i,t} = \beta_0 &+ \beta_1 High_{i,t-1} + \beta_2 Low_{i,t-1} \\ &+ \beta_3 Size_{i,t-1} + \beta_4 P/B_{i,t-1} + \beta_5 ROA_{i,t-1} + \beta_6 D/E_{i,t-1} \\ &+ \beta_7 GDP_{c,t-1} + \beta_8 Inst_{i,t-1} + \Lambda + \epsilon_{i,t} \end{aligned} \tag{5}$$

$$\begin{aligned} Env_{i,t} \text{ or } CO_{2i,t} = \beta_0 &+ \beta_1 \text{ D-High}_{i,t-1} + \beta_2 \text{ D-Low}_{i,t-1} + \beta_3 Foreign_{i,t-1} \\ &+ \beta_4 Size_{i,t-1} + \beta_5 P/B_{i,t-1} + \beta_6 ROA_{i,t-1} + \beta_7 D/E_{i,t-1} \\ &+ \beta_8 GDP_{c,t-1} + \beta_9 Inst_{i,t-1} + \Lambda + \epsilon_{i,t} \end{aligned} \tag{6}$$

Env is the environmental pillar score in year t and CO_2 is the carbon intensity measure. $High$ and Low are the percentages held by state-owners who have represented a high or low interest in environmental performance according to the definitions above. In Model 6 the prefix D refers to domestic state-owners and $Foreign$ is total foreign state ownership. SOE, $Size$, P/B, ROA, and D/E are as in Model 1. Λ refers to fixed effects: all models include country FE, models using WVS and EPS include year FE, and models with CO_2 as dependent variable include industry group FE.

Institutional environment

This set of tests introduces more institutional variables. The joint effects of politicization (POL), minority investor protection (MPI), and anti-corruption (CPI) with domestic state ownership are tested separately. First, I interact the continuous percentage of domestic state ownership with the continuous degree of politicization variable. All European countries in the data are relatively democratic, so I exclude V-Dem polyarchy from the politicization tests where only European data is used. I perform the test first for all sample years and countries, and then only in 2015, right after the survey for the politicization measure ended, for countries with a polyarchy

score above 0.8 to ensure the potential effect of democracy is eliminated.

I perform similar regressions to minority investor protection and corruption within democracy brackets and using global data. Interaction of the institutional variable of interest with domestic state ownership is used here as well. All three additional institutional environment variables are discussed more thoroughly in Section 3.2. The basis of the models is presented below:

$$\begin{aligned} Pillar_{i,t} = \beta_0 &+ \beta_1 DS_{i,t-1} X_{c,t-1} + \beta_2 DS_{i,t-1} + \beta_3 X_{c,t-1} \\ &+ \beta_4 Size_{i,t-1} + \beta_5 P/B_{i,t-1} + \beta_6 ROA_{i,t-1} + \beta_7 D/E_{i,t-1} \\ &+ \beta_9 GDP_{c,t-1} + \beta_{10} Inst_{i,t-1} + \Lambda + \epsilon_{i,t} \end{aligned} \tag{7}$$

DS is total domestic state ownership in firm i in year $t-1$. X is the institutional variable of interest, one of POL, MPI, and CPI. POL is used as stable across all years, MPI and CPI are lagged one year. $Pillar$, $Size$, P/B, ROA, D/E, GDP, and $Inst$ are as in Model 1. Λ refers to fixed effects: year FE are included in multi-year models and industry group FE with models where G is the dependent variable.

I also aggregate the institutional environment by dividing the sample according to legal origin. For all subsamples separately, I perform regressions following Model 3. However, I replace GDP with country fixed effects in the right-hand-side.

Reporting or 'hard' ESG

The last test employs the baseline regression Model 1 to a range of dependent variables, which are classified as being reporting, transparency, or policy-oriented variables, or 'hard' variables. In regressions where the dependent variable is binary, I use logit models instead. All models in this specification include year and industry group fixed effects but not country due to its high correlation with the democracy variable.

5 Results and analysis

5.1 Baseline regression

Before going into differences by institutional environment, I first present the aggregate global effect of state ownership as well as the effect of including a minimum information cutoff to the total percentage of shares available in the data. In Table 4, it can be seen that as the sample size reduces from 57,095 firm-year observations without a minimum information cutoff to 43,750 with a 50% cutoff, results stay very similar. The average effect of state ownership, defined dichotomously as at least 5% of shares, is positive and significant for all three pillar scores. The results are mostly in line with those of Hsu et al. (2021) with the exception of a positive SOE effect on the governance pillar in my results. The coefficient estimates vary around 3-4, which can be interpreted as a percentage because pillar scores are normalized to the range 0-100.

Total assets, price-to-book, and return-on-assets have a positive loading on all pillar scores while leverage has a negative relationship. However, the effect of ROA on social pillar is only weakly significant. In line with the findings of Dyck, Lins, et al. (2019), institutional ownership appears to be positively related to pillar scores. One considerable observation related to Table 4 is that the adjusted R^2 is much higher for environmental and social pillars, about 0.34, than for governance pillar, about 0.13.

A positive and significant relationship between state ownership and pillar scores can be documented generally speaking as the result of two types of behavior. First, politicians and state officials may choose to buy shares of firms that have high pillar scores and sell portfolio companies that do not act responsibly. Second, politicians and state officials may actively engage in the decision-making process of portfolio companies by using their voice as shareholders, which would be interpreted as a causal effect. I try to alleviate the effect of selection by modelling the selection of SOEs based on observable firm-level characteristics and then including results based

Table 4: State ownership and pillar scores

This table reports estimates from regressing Refinitiv ESG pillar scores on a state ownership dummy and control variables for samples with a different minimum information cutoff. A cutoff of 10% means that the value of variable 'Total % shares held' from Eikon has to the be at least 10% for the firm-year observation. SOE is one if at least 5% of shares are owned by state entities and zero otherwise. (Log of) Total assets, price-to-book, return-on-assets, debt-to-equity, and ownership by institutional investors are winsorized yearly at the 2.5th and 97.5th percentiles. All controls are lagged one year. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	Environmental pillar			Social pillar			Governance pillar		
Inform. cutoff	0%	10%	50%	0%	10%	50%	0%	10%	50%
SOE	3.419***	3.266***	3.205***	3.958***	3.856***	4.400***	2.859***	2.783***	3.689***
	(3.435)	(3.273)	(3.010)	(4.779)	(4.628)	(5.051)	(3.652)	(3.541)	(4.423)
Total assets	8.746***	8.755***	8.856***	7.142***	7.141***	7.015***	4.722***	4.711***	4.431***
	(43.907)	(43.897)	(40.324)	(47.830)	(47.863)	(43.505)	(30.152)	(30.187)	(26.288)
P/B	0.854***	0.851***	0.886***	1.200***	1.202***	1.191***	0.198***	0.192**	0.224***
	(9.818)	(9.748)	(9.515)	(17.377)	(17.320)	(16.431)	(2.609)	(2.519)	(2.818)
ROA	0.160***	0.157***	0.193***	0.028	0.027	0.036*	0.128***	0.134***	0.154***
	(8.250)	(8.065)	(9.202)	(1.570)	(1.526)	(1.822)	(6.279)	(6.592)	(6.842)
D/E	−0.020***	−0.020***	−0.021***	−0.019***	−0.019***	−0.019***	−0.008***	−0.008***	−0.009***
	(−10.039)	(−9.962)	(−9.338)	(−12.491)	(−12.555)	(−11.864)	(−4.411)	(−4.371)	(−5.113)
Institutions	0.070***	0.065***	0.040***	0.097***	0.094***	0.087***	0.070***	0.068***	0.093***
	(5.128)	(4.676)	(2.618)	(9.061)	(8.667)	(7.273)	(9.300)	(8.980)	(11.364)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	No	No	No	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Observations	57,095	56,432	43,750	57,095	56,432	43,750	57,095	56,432	43,750
Adjusted R^2	0.345	0.346	0.339	0.344	0.344	0.332	0.131	0.131	0.128

Note: *p<0.1; **p<0.05; ***p<0.01

on the estimated selection model to the second-stage regression as a control variable (Heckman, 1976).

However, selection of SOEs is highly contingent on very specific and often unobservable situations, such as rescuing a flagship airline from distress in the midst of a financial crisis, adapting to changes in prices of energy resources by diversifying abroad, or selling off non-strategic holdings to gain liquidity. Historical trajectories also play a major role in the state-owners' portfolios, such as the Government of Finland holding more than a third of alcoholic beverage company Altia's shares[9]. Therefore, the selection model excludes a large share of reasons behind state ownership and obviously doesn't completely eliminate the effect of selection in the baseline model.

Table 5: Selection equation: state ownership

This table reports estimates for a selection model regressing state ownership on firm-level control variables and fixed effects. Dependent variable SOE is one if at least 5% of shares are owned by state entities and zero otherwise. (Log of) Total assets, price-to-book, return-on-assets and debt-to-equity are winsorized yearly at the 2.5th and 97.5th percentiles. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	SOE
Total assets	0.220^{***}
	(26.808)
P/B	-0.002
	(-0.459)
ROA	-0.006^{***}
	(-3.424)
D/E	-0.0003^{***}
	(-4.002)
Year FE	Yes
Industry FE	Yes
Country FE	Yes
Observations	56,432
Pseudo R^2	0.401
Note:	*p<0.1; **p<0.05; ***p<0.01

[9]Altia used to have monopoly rights for the production of alcoholic beverages in Finland. For more, see https://altiagroup.com/about-us/our-history.

Table 5 shows that while size is positively related to the probability of being an SOE, return-on-assets and leverage have a negative loading. The model explains roughly 40% of variation in likelihood to be state-owned according to the pseudo R^2, leaving about 60% unexplained.

As a difference to the baseline model, I did not include institutional ownership in the selection model. The reasoning is that while institutional ownership potentially has a significant correlation with state ownership, I assumed that state decision-makers do not place much weight on the level of institutional ownership when selecting portfolio companies. Nevertheless, including institutional ownership to the selection equation did not have an appreciable effect on results in unreported tests.

The main regression model adds two elements to the aggregate global results. First, it includes the effect of my principal institutional environment variable, democracy, to state ownership's relationship with pillar scores. Second, it adds inverse Mills from the first stage of the selection-control procedure. Table 6 reports results for the baseline tests. SOEs have a significantly higher E and S even after controlling for selection. However, in line with my prediction, the joint effect of state ownership and being based in an autocratic country is negative and significant to the extent the overall effect of autocratic state ownership is negative for E (-6.21) and only slightly positive (1.42) for social score. Including inverse Mills tones down the effect of state ownership on all pillars: the coefficient estimates of state ownership on E and S are roughly halved when a selection control is added. In case of the governance score, inverse Mills decreases the stand-alone SOE effect from being positive and significant at the 1%-level to not significant at all, emphasizing the importance of controlling for selection.

Hsu et al. (2021) use shocks affecting the cost of environmental engagement to identify causal effects from correlation in the nuclear and emission-intensive industries but they do not present evidence of the individual magnitudes of selection and active ownership. While the selection equation I use is obviously imperfect, the results display that selection can explain at least half of the premium in environmental and

social pillar scores exhibited by democratic country SOEs and completely eliminate it on governance pillar.

Table 6: State ownership, democracy, and pillar scores

This table reports estimates from regressing Refinitiv ESG pillar scores on state ownership and democracy dummies, their interaction, and control variables. SOE is one if at least 5% of shares are owned by state entities and zero otherwise. AUT is one if the V-Dem polyarchy score of the country of incorporation is less than 0.5 (autocracy) and zero otherwise. Mills is the inverse Mills ratio from selection equation 2. (Log of) Total assets, price-to-book, return-on-assets, debt-to-equity, and ownership by institutional investors are winsorized yearly at the 2.5th and 97.5th percentiles. All controls are lagged one year. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	Environmental pillar		Social pillar		Governance pillar	
SOE	8.669***	3.304***	9.710***	5.249***	3.098***	0.943
	(7.385)	(2.762)	(10.029)	(5.262)	(3.279)	(0.993)
AUT	−13.877***	−15.767***	−13.983***	−15.555***	−2.586***	−2.897***
	(−13.717)	(−15.476)	(−15.278)	(−16.955)	(−2.876)	(−3.207)
SOE x AUT	−10.134***	−9.517***	−4.338**	−3.825**	0.805	1.290
	(−5.004)	(−4.672)	(−2.365)	(−2.092)	(0.474)	(0.758)
Mills		−5.058***		−4.206***		−1.872***
		(−12.346)		(−12.039)		(−5.310)
Total assets	8.684***	7.977***	6.728***	6.140***	4.428***	4.475***
	(44.516)	(38.696)	(44.119)	(38.147)	(29.917)	(26.891)
P/B	0.654***	0.706***	1.227***	1.270***	0.252***	0.208***
	(7.210)	(7.905)	(16.534)	(17.373)	(3.394)	(2.718)
ROA	0.259***	0.272***	0.114***	0.125***	0.158***	0.134***
	(12.936)	(13.804)	(6.180)	(6.919)	(8.797)	(6.598)
D/E	−0.019***	−0.019***	−0.015***	−0.016***	−0.010***	−0.008***
	(−8.556)	(−9.047)	(−8.938)	(−9.461)	(−5.966)	(−4.450)
Institutions	−0.123***	−0.103***	0.033***	0.049***	0.060***	0.072***
	(−11.770)	(−9.749)	(3.903)	(5.931)	(7.219)	(8.318)
GDP/capita	1.555***	2.206***	−0.108	0.434	−0.289	0.027
	(3.587)	(5.048)	(−0.302)	(1.206)	(−0.815)	(0.074)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	No	Yes	Yes
Country FE	No	No	No	No	No	No
Observations	56,432	56,432	56,432	56,432	56,432	56,432
Adjusted R^2	0.261	0.278	0.242	0.260	0.104	0.135

Note: *p<0.1; **p<0.05; ***p<0.01

Unsurprisingly, companies from democratic countries have considerably higher environmental and social pillar scores than companies from autocratic countries, by roughly 16 percentage points. However, the negative loading on *AUT* on the governance pillar is surprising considering that governance pillar should reflect corporate governance quality compared to other companies in the same country. Another

unexpected result is the negative coefficient estimate of the percentage of shares held by institutions on E. While Hsu et al. (2021) find results similar to this in some specifications, previous research has more often documented that (foreign) institutional ownership has a positive association with CSR (Dyck, Lins, et al., 2019; Oh et al., 2011).

Table 7 splits the sample to four democracy brackets and disaggregates state ownership to domestic and foreign ownership by government agencies (GA) and SWFs. The brackets are unbalanced because a majority of the sample is clustered in democratic countries. The fourth bracket, where V-Dem polyarchy is above 0.75, has more than 15 times the firm-year observations of the first bracket. However, explanatory power of the models seem to be relatively unrelated to sample size based on adjusted R^2.

By first looking at the model with all countries and no democracy restrictions, foreign SWFs seem to have a positive relation with all pillar scores. This finding is contrary to Hsu et al. (2021), who document no effect by foreign state ownership or SWFs overall. Domestic state ownership by GAs and SWFs increases social pillar while domestic GAs do not raise environmental pillar. Foreign GAs have an insignificant relation to all pillars.

The results get quite ambiguous when the sample is split to democracy brackets. The positive effect of foreign SWFs remains positive only in the top bracket for all pillars: a one percentage point increase in holdings by foreign SWFs increases all pillar scores by about 0.8, an economically large loading. Foreign SWFs decrease E and S in the two middle brackets and have no effect in the bottom bracket.

The bottom bracket pillar scores seem to be relatively unaffected by any kind of state ownership – only domestic SWF ownership gets a significant positive relationship with E and S at the 10%-level. Results in the middle brackets are conflicting with relation to my predictions. Top bracket E is positively and significantly affected by domestic GAs but not SWFs, a result that is in line with my expectation. On the other hand, domestic SWFs have a significant positive loading on G.

Table 7: State ownership, democracy brackets, and pillar scores

This table reports estimates from regressing Refinitiv ESG pillar scores on state ownership and control variables within democracy brackets. Democracy brackets are based on the country of incorporation's V-Dem polyarchy score, lagged one year. State ownership is classified as domestic or foreign and split to government agencies (GA) or sovereign wealth funds (SWF). Control variables include log of total assets, price-to-book, return-on-assets, debt-to-equity and total institutional ownership, winsorized yearly at the 2.5th and 97.5th percentiles, and log of GDP per capita. All controls are lagged one year. Panels A and B include country and year fixed effects, and Panel C includes industry group and year fixed effects. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

		Democracy brackets			
	All	<=0.25	0.25-0.50	0.50-0.75	>0.75
			Panel A: Environmental pillar		
Domestic GA	0.046	0.081	0.041	−0.024	0.140***
	(1.402)	(1.553)	(0.662)	(−0.402)	(2.641)
Domestic SWF	0.146**	0.149*	0.271***	0.101	0.117
	(2.392)	(1.845)	(2.941)	(0.327)	(0.540)
Foreign GA	0.209	0.183	−0.298***	0.102	0.277
	(1.406)	(1.095)	(−3.363)	(0.410)	(1.416)
Foreign SWF	0.342**	0.104	−0.486***	−0.313***	0.804***
	(2.064)	(0.335)	(−4.933)	(−2.961)	(3.786)
Adjusted R^2	0.346	0.254	0.161	0.127	0.371
			Panel B: Social pillar		
Domestic GA	0.073***	0.049	0.163**	0.083*	0.054
	(2.763)	(1.262)	(1.979)	(1.689)	(1.383)
Domestic SWF	0.114**	0.097*	0.214***	0.083	−0.017
	(2.268)	(1.794)	(2.740)	(0.357)	(−0.128)
Foreign GA	−0.015	−0.172	−0.430***	−0.095	0.133
	(−0.124)	(−0.883)	(−5.358)	(−0.662)	(1.123)
Foreign SWF	0.398***	0.034	−0.150*	−0.185***	0.760***
	(2.934)	(0.143)	(−1.692)	(−2.627)	(4.824)
Adjusted R^2	0.345	0.346	0.204	0.206	0.345
			Panel C: Governance pillar		
Domestic GA	−0.068**	0.033	0.021	−0.202***	−0.009
	(−2.363)	(0.503)	(0.274)	(−3.357)	(−0.248)
Domestic SWF	0.201***	0.059	0.294***	0.517***	0.512***
	(4.100)	(0.771)	(5.665)	(3.262)	(3.775)
Foreign GA	0.247	0.044	0.011	0.297**	0.288
	(1.491)	(0.243)	(0.121)	(1.999)	(1.002)
Foreign SWF	0.650***	0.477	−0.075	0.554***	0.764***
	(4.646)	(1.403)	(−0.526)	(4.104)	(3.505)
Adjusted R^2	0.136	0.117	0.156	0.148	0.157
Observations	56,432	3,058	3,234	3,796	46,344
Countries	69	11	19	21	38

Note: *p<0.1; **p<0.05; ***p<0.01

To summarize the results from Table 7, state ownership doesn't have a monotonous effect on all pillar scores that is independent of the type of state ownership. The controlling state entity being domestic or foreign and classification as SWF or GA matters in terms of pillar scores. However, ambiguity of the results prevents any generalization. The ambiguity may be a product of for example single countries driving the results especially in the first three brackets with 11 to 21 countries. One way to interpret the ambiguous results is that democracy of countries is probably not the strongest characteristic of the institutional environment determining state ownership's effect on pillar scores.

5.2 Changes in state ownership

In this section, I relate changes in state ownership to changes in pillar scores. First, I use changes from less than 2% of shares held by the state to at least 5% and the other way around to identify sales and purchases of SOEs and look at pillar scores before and after those events. Second, I present results from a first-differences regression, which follows changes in pillar scores subsequent to any change in ownership level. Results of the event study approach are presented in Figures 2 and 3. Pillar scores are compared to those of a propensity score matched control group of companies from the same country in the year of the treatment. A time series of aggregate differences between the treatment and control group is presented from three years before until three years after the event. The first panel of both figures tracks only companies from democratic countries and the second panel companies from autocratic countries.

First, looking at purchases of state companies in democratic countries, a positive drift after the treatment can be seen in all three pillars. Pre-trends appear quite stable, and a statistically significant, although only barely, positive effect can be detected in E and G already after one year of state ownership. However, the effect on G becomes statistically insignificant after three years. Overall, the effect on E and S is in the range of 4-5 but smaller on G. The positive change subsequent to an increase in state ownership is in line with my predictions and the findings of Hsu et al. (2021) who documented an increase in environmental pillar one year after

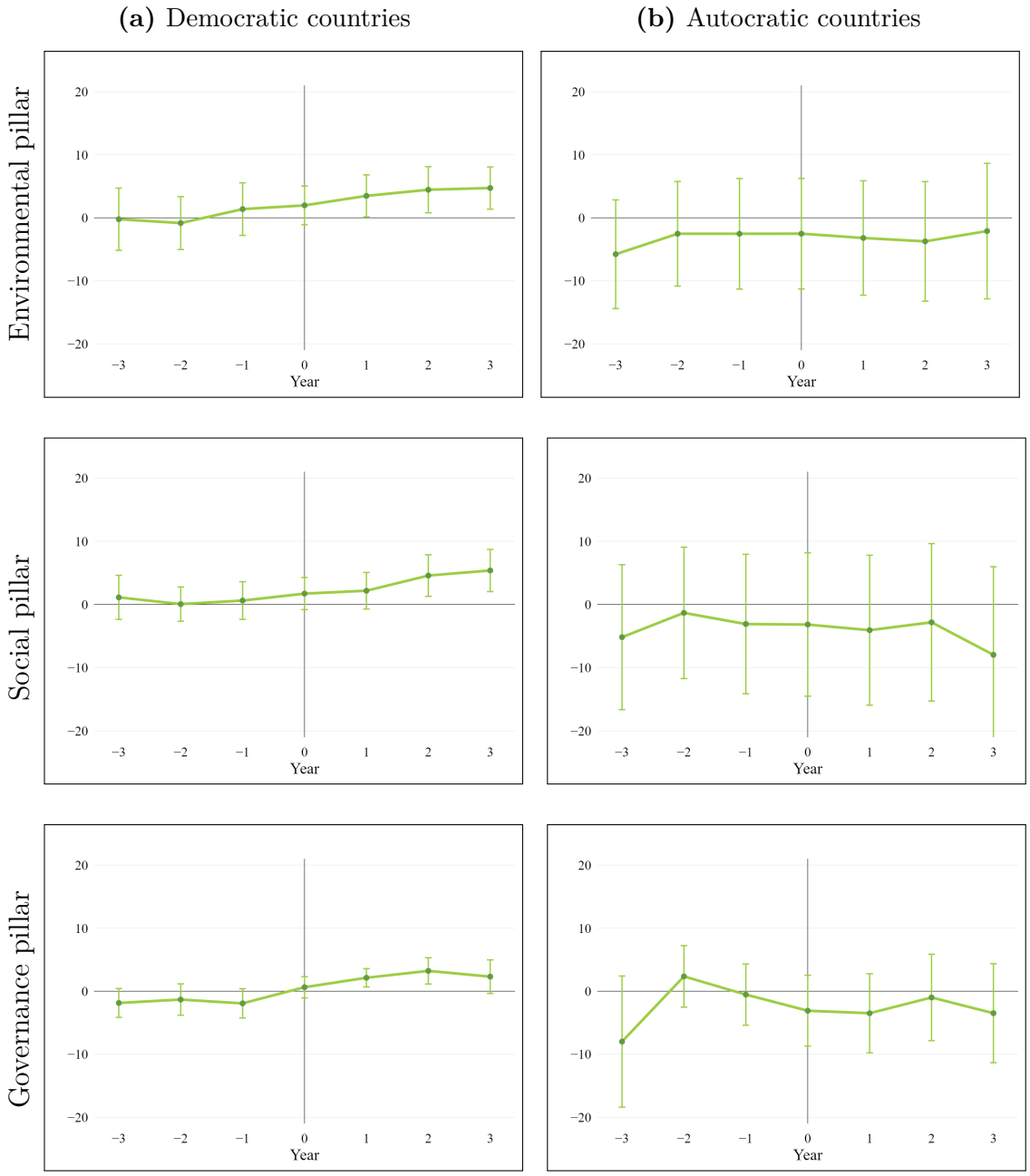

Figure 2: Event study approach: becoming an SOE

This figure reports changes in ESG pillar scores from three years before and three years after an increase in state ownership from less than 2% to at least 5% for treatment and control companies. Democracies are countries whose average V-Dem polyarchy score in 2001-2018 is above 0.5 and autocracies the opposite. The effect is estimated with a difference-in-differences regression with year and firm fixed effects and multiple treatment periods. The control group consists of nearest-neighbour propensity score matched firms for the treatment, with exact matching on country and year. PSM variables include price-to-book, return-on-assets and debt-to-equity, winsorized yearly at the 2.5th and 97.5th percentiles, and industry group fixed effects. Error bars indicate the 95% confidence interval. Year 0 is the year when the company became an SOE.

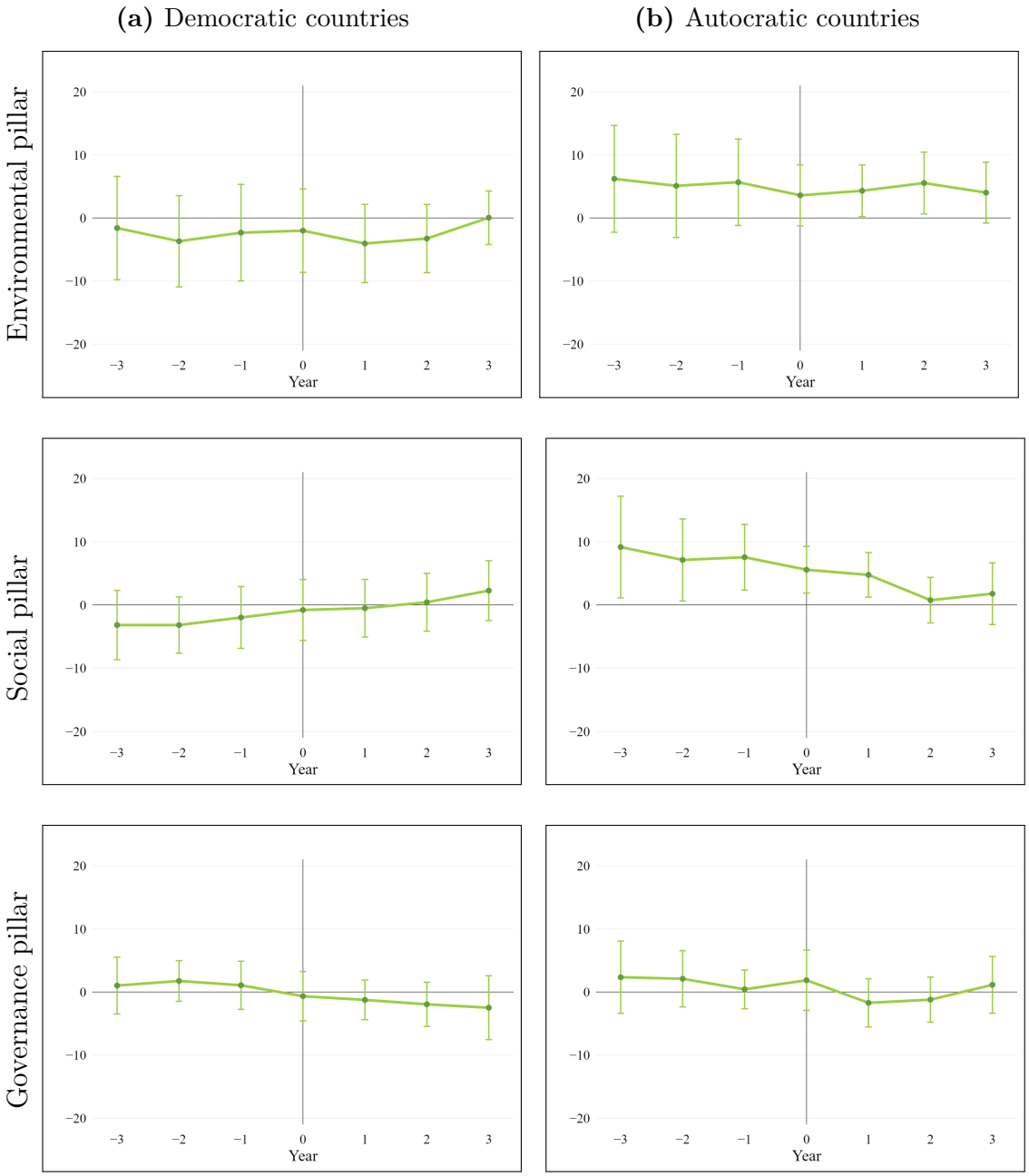

Figure 3: Event study approach: sale of SOE

This figure reports changes in ESG pillar scores from three years before and three years after a decrease in state ownership from at least 5% to less than 2% for treatment and control companies. Democracies are countries whose average V-Dem polyarchy score in 2001-2018 is above 0.5 and autocracies the opposite. The effect is estimated with a difference-in-differences regression with year and firm fixed effects and multiple treatment periods. The control group consists of nearest-neighbour propensity score matched firms for the treatment, with exact matching on country and year. PSM variables include price-to-book, return-on-assets and debt-to-equity, winsorized yearly at the 2.5th and 97.5th percentiles, and industry group fixed effects. Error bars indicate the 95% confidence interval. Year 0 is the year when the company ceased to be an SOE.

substantial increases in state ownership.

In autocratic countries, the confidence intervals are considerably larger due to a smaller sample of events. Still, no positive or negative trends can be detected in any of the pillar scores prior or post to becoming an SOE.

When sales of SOEs are used as treatment, no similar patterns seem to be present in democratic countries. There is a positive drift for S and a negative drift for G but differences to control companies are never significant. The lack of a negative drift as predicted by my hypotheses could be explained by an negative signalling value from weakened CSR or the cost of maintaining a high level of CSR being lower than the cost of excessive CSR.

In autocratic countries, there also appear to be no changes in pillar scores related to sales of SOEs. S is, however, larger for treatment companies before the treatment and the difference reduces to insignificant two years after.

The second method exploiting changes in state ownership is a first-differences regression, performed for each pillar score and democratic and autocratic countries separately. The results suggest a weakly positive effect on S from changes in state ownership in democracies. The coefficient estimate on E is of the same size but not significant. In autocracies, increases (decreases) in state ownership seem to be associated with a negative (positive) change in E. Institutional ownership appears unrelated to changes in pillar scores. Explanatory power of the model as measured by adjusted R^2 is much higher for E and S, whereas it is essentially zero for G, implying a very poor fit.

5.3 Propensity score matching

In this section, I use propensity score matching to compare SOEs to a set of domestic control companies first according to the democracy environment and then across countries. SOEs are defined based on *domestic* state ownership being at least 5% in this section to allow better comparison of countries and provide more detail on the type of state ownership that my literature review and hypotheses focus on. The

Table 8: First-differences regressions

This table reports estimates from first-differences regressions of Refinitiv ESG pillar scores on state ownership and control variables. Democracies are countries whose average V-Dem polyarchy score in 2001-2018 is above 0.5 and autocracies the opposite. State-& is the percentage of shares held by state entities. Institutions is the percentage of shares held by institutional investors, winsorized yearly at the 2.5th and 97.5th percentiles. Controls variables include log of total assets, price-to-book, return-on-assets and debt-to-equity, winsorized yearly at the 2.5th and 97.5th percentiles and log of GDP per capita. All controls are lagged one year. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	Democracies			Autocracies		
	Env	Soc	Gov	Env	Soc	Gov
State	0.029	0.034*	−0.013	−0.059**	−0.021	−0.028
	(1.280)	(1.939)	(−0.419)	(−2.310)	(−0.830)	(−0.709)
Institutions	−0.006	−0.003	−0.002	−0.011	0.023	0.041
	(−1.012)	(−0.604)	(−0.245)	(−0.346)	(1.028)	(1.141)
Observations	43,722	43,722	43,722	4,933	4,933	4,933
Countries	47	47	47	22	22	22
Adjusted R^2	0.006	0.003	0.001	0.005	0.006	−0.001
Note:						*p<0.1; **p<0.05; ***p<0.01

analysis is limited to ESG pillar scores in 2019. To highlight the effect of selection and value of choosing suitable control companies, differences-in-differences are displayed compared to the entire group of POEs in the data set as well.

Table 9 reports average pillar scores for SOEs and control POEs in democracies and autocracies and the difference-in-differences of the four categories of companies, with control groups of all POEs in the data in 2019, and only propensity score matched POEs. When all companies are included, SOEs have large responsibility premiums over POEs in democratic countries as measured with all three pillar scores. Differences-in-differences are also economically and statistically significant.

Compared to the PSM control group, differences between environmental and social scores are large in both democratic and autocratic countries, suggesting that selection cannot explain the premium in those scores completely. While the difference in E of democratic country SOEs and POEs is economically quite large at 5.12, it is barely statistically insignificant. With relation to the governance score, no differences at all are documented.

Table 9: Difference-in-differences: SOEs and democracy

This table reports differences-in-differences in Refinitiv ESG pillar scores of SOEs and POEs in democracies and autocracies in 2019. Democracies are countries whose V-Dem polyarchy score in 2018 is above 0.5 and autocracies the opposite. SOEs are defined as at least 5% of shares being held by domestic state entities in the end of 2018. POEs are either all POEs in the data set or a nearest-neighbour propensity score matched control group from a pool of POEs with exact match on country. Countries are only included in the PSM group if the data contains at least double the amount of POEs in the country of incorporation. PSM variables include price-to-book, return-on-assets and debt-to-equity, winsorized at the 2.5th and 97.5th percentiles, and industry group fixed effects. T-statistics are reported in parentheses.

Control group:	All POEs, 2019				PSM, 2019			
	SOEs	POEs	Difference	N	SOEs	POEs	Difference	N
				Panel A: Environmental pillar				
Democracies	51.48	31.93	19.55***	5,958	55.00	49.88	5.12	298
			(11.28)				(1.60)	
Autocracies	35.55	33.91	1.64	1,152	47.00	35.42	11.58***	138
			(0.75)				(2.82)	
Difference	15.93***	-1.98**	17.90***		8.00**	14.46***	-6.47	
	(6.05)	(-2.18)	(5.87)		(2.20)	(3.90)	(-1.19)	
				Panel B: Social pillar				
Democracies	62.29	46.36	15.93***	5,958	63.98	57.70	6.28**	298
			(11.49)				(2.41)	
Autocracies	46.13	36.43	9.70***	1,152	50.88	41.61	9.27**	138
			(4.94)				(2.48)	
Difference	16.16***	9.93***	6.24**		13.10***	16.09***	-2.99	
	(7.12)	(12.63)	(2.56)		(3.97)	(5.12)	(-0.65)	
				Panel C: Governance pillar				
Democracies	53.93	48.30	5.63***	5,958	53.49	52.41	1.08	298
			(4.06)				(0.40)	
Autocracies	53.12	49.05	4.07**	1,152	53.88	50.63	3.25	138
			(2.31)				(0.93)	
Difference	0.81	-0.75	1.56		-0.39	1.78	-2.17	
	(0.38)	(-1.01)	(0.66)		(-0.12)	(0.58)	(-0.47)	
Observations	415	6,695			218	218		

Note: *p<0.1; **p<0.05; ***p<0.01

The reductions in the SOE premium in democratic countries resulting from the addition of a selection procedure (PSM) are somewhat stronger than estimated with inserting inverse Mills ratios to baseline regressions to control for selection. With PSM, the difference in E reduces by three quarters, S by almost two thirds, and G completely.

Differences-in-differences with PSM are not significant for any pillar score. Therefore, these results are contrary to my expectation that only in democratic countries

would SOEs have higher E and S scores than otherwise similar POEs. In other words, democracy seems unrelated to state ownership's causal effect on pillar scores based on this methodology, as opposed to the findings from tracking changes in pillar scores subsequent to becoming an SOE and from the baseline regressions in Table 6. Results should, however, only be reckoned with the plausibility of the selection model overall.

Figure 4 shows average pillar scores of SOEs by country in the left panel, and average differences to the propensity score matched control POEs on the right panel. Only countries with a minimum of three SOEs are included in this visualization. Most democratic countries are clustered to the top in the left panel for E and S whereas G, which is benchmarked across country, looks unrelated to democracy, as expected. There are, however, some notable exceptions, such as Switzerland which is on the bottom right in all figures in the left panel as well as India, whose SOEs appear poorly governed compared to all domestic POEs.

Looking at the right panel, which compares SOEs to matched POEs, Switzerland is joined by Belgium in the bottom right, i.e. countries that are democratic but have SOEs with low ESG scores. Democratic countries still mostly cluster to the top in E and S.

An unexpected finding is that no autocratic country lies below 0 in E and S difference to POEs. Still, there are only four autocracies that have at least twice the amount of POEs than SOEs, and at least three SOEs in the sample. Among autocratic countries, Singapore, whose polyarchy score is around 0.4, stands out with an average difference of about 20 in all pillar scores. However, Singapore's other institutions determining financial market outcomes are quite abnormal within the defined group of autocratic countries.

5.4 Interest categorization

In this section, state-owners are classified to groups based on observable proxies of their preferences with relation to environmental performance. First, government and

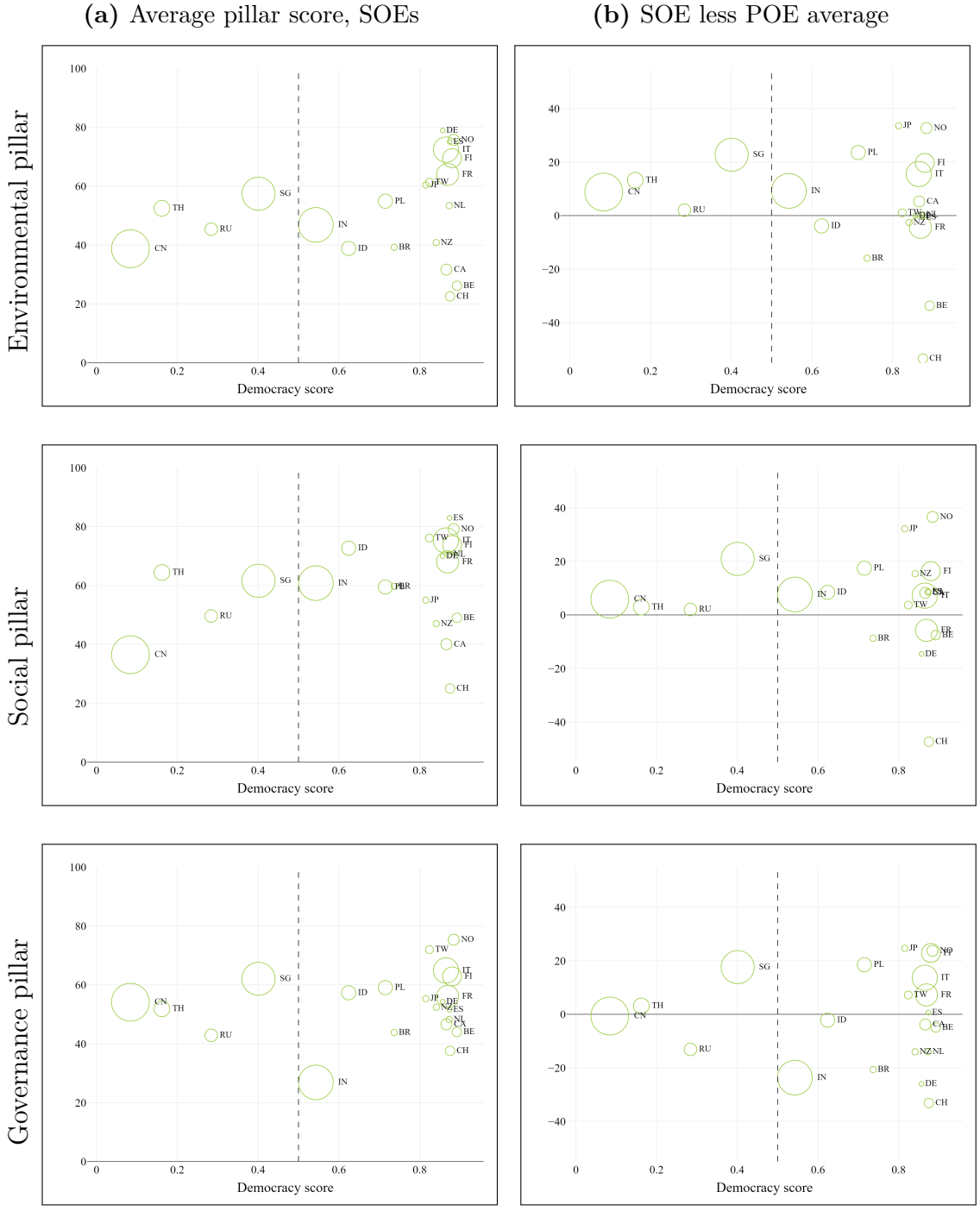

Figure 4: Average country-level pillar scores of SOEs

This figure reports country-level SOE pillar score performance. X-axis is the country's V-Dem polyarchy score as of 2018. Y-axis is the average pillar score in column (a) and the average country-level difference of SOEs and POEs in column (b). SOEs, defined as a minimum of 5% of shares under domestic state ownership, are propensity score matched to one control company. The matching procedure includes exact matching on country and other controls are total assets, price-to-book, debt-to-equity, and return-on-assets value, winsorized at the 2.5th and 97.5th percentiles. For a country to be included, it is required that there are at least three SOEs in the data, as well as at least double the amount of POEs in the matching pool. The size of a bubble represents the amount of SOEs in the data.

citizen attitudes are defined based on Environmental Policy Stringency Index and World Values Survey results, respectively. Second, state representatives' interests are proxied according to net zero target initiatives.

The first two columns in Table 10 indicate that state ownership only has a positive effect on E when the owner is a state entity from a country above median in the EPS index. That is, government interests are quite clearly reflected in CSR decisions of SOEs. Surprisingly in light of my hypotheses, the effect is milder when only domestic owners are considered – down from 0.210 for each percent held by all high-EPS countries to 0.140 with only domestic high-EPS countries. At the same time, the t-statistic dropped from 3.265 to 2.145.

A similar result is found based on columns 3-4 using WVS categories. Citizen interests appear to radiate to state ownership and E, albeit not quite as much as government interests (latest EPS has a correlation of 0.37 with WVS among sample countries). The sample sizes are different because countries that do not have data on EPS or WVS had to be excluded from the regressions that measure domestic state ownership as their interest proxies are unknown.

Foreign owners have a significant positive effect on E without interest categorization of countries. This is in line with results in Table 7 although Hsu et al. (2021) documented a neutral effect by foreign state-owners. Institutional ownership is positively related to E in all four models, which is in line with previous research (Dyck, Lins, et al., 2019; Oh et al., 2011).

When state-owners are classified based on NZT-initiatives in Table 11, implications stay similar as with EPS and WVS: only state-owners from countries with a NZT in place or under discussion have a positive association with E. The coefficient estimate loses its significance when only domestic NZT-owners are considered, however.

Using carbon intensity as the dependent variable, which is in direct focus of the stated interests, the decreasing effect of NZT-owners is only weakly significant with domestic owners and not significant when foreign NZT state ownership is included. Foreign state-owners, who are not classified on NZT, interestingly have a negative

significant loading on carbon intensity. Institutional ownership is also only weakly negatively related to carbon emissions in one of two regressions.

Table 10: State ownership and environmental attitudes and performance

This table reports estimates from regressing Refinitiv Environmental pillar scores on state ownership by interest proxies of government and citizens, and control variables. State ownership variables are totals of shares held by state entities from countries above or below median of interest variables. Environmental Policy Stringency Index (EPS), proxies government interests. Mean answers to World Values Survey questions about prioritizing environment above or below economic prosperity (WVS), proxies citizen interests. The proxies are discussed more thoroughly in Section 3.2. State ownership of countries lacking EPS or WVS data is excluded, and in models 2 and 4 all companies from those countries are excluded. Institutions is the percentage of shares held by institutional investors, winsorized yearly at the 2.5th and 97.5th percentiles. Controls variables include log of total assets, price-to-book, return-on-assets and debt-to-equity, winsorized yearly at the 2.5th and 97.5th percentiles, and log of GDP per capita. All controls are lagged one year. All models include country fixed effects. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

Interest proxy:	EPS		WVS	
	Environmental pillar			
Total above median	0.210***		0.134***	
	(3.265)		(3.215)	
Total below median	0.003		0.034	
	(0.066)		(0.842)	
Domestic above median		0.140**		0.097**
		(2.145)		(2.267)
Domestic below median		−0.008		0.039
		(−0.202)		(0.944)
Foreign states		0.436***		0.308**
		(2.590)		(2.380)
Institutions	0.066***	0.066***	0.066***	0.064***
	(4.776)	(4.566)	(4.783)	(4.529)
Avg. high	1.29%	0.59%	1.83%	1.00%
Avg. low	1.12%	1.16%	1.28%	1.15%
Avg. foreign		1.06%		1.07%
Observations	56,432	49,949	56,432	55,010
Adjusted R^2	0.346	0.360	0.346	0.347
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 11: State ownership, net zero target, and environmental performance

This table reports estimates from regressing firm-level environmental performance in 2019 on state ownership and control variables. Dependent variables are the Refinitiv Environmental pillar score and total CO_2 emissions divided by total assets winsorized at the 2.5th and 97.5th percentiles. State ownership variables are totals of shares held by state entities from countries with or without a CO_2 emissions Net Zero Target in place or under discussion at the end of 2019. Institutions is the percentage of shares held by institutional investors, winsorized at the 2.5th and 97.5th percentiles. Controls variables include log of total assets, price-to-book, return-on-assets and debt-to-equity, winsorized at the 2.5th and 97.5th percentiles, and log of GDP per capita. All controls are lagged one year. All models include country fixed effects. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	Environmental pillar		CO_2/A	
Total, NZT	0.183***		−1.274	
	(2.848)		(−1.636)	
Total, no target	0.029		−0.027	
	(0.770)		(−0.047)	
Domestic, NZT		0.065		−1.401*
		(0.988)		(−1.768)
Domestic, no target		0.044		0.429
		(1.131)		(0.735)
Foreign states		0.303***		−4.374**
		(2.658)		(−2.472)
Institutions	0.095***	0.092***	−0.472*	−0.429
	(7.092)	(6.880)	(−1.663)	(−1.505)
Avg. NZT	1.22%	0.39%	1.97%	0.80%
Avg. non-NZT	1.79%	1.45%	2.44%	1.98%
Avg. foreign		1.17%		1.63%
Observations	7,110	7,110	3,087	3,087
Adjusted R^2	0.437	0.437	0.471	0.472
Note:				*p<0.1; **p<0.05; ***p<0.01

5.5 Politicization, investor protection, and corruption

Some variables describing the institutional environment that potentially shape state ownership are explored next. The models use joint-effects of a continuous institution variable with a continuous domestic state ownership variable. I also present results for ownership type-models in subsamples by legal origin.

Table 12 considers the 16 European countries that have data for the degree of politicization measure I use. To eliminate any potential effect from democracy, I

exclude any countries below 0.8 in V-Dem polyarchy score from the second set of models. Data for perceived politicization was built around 2014. Thus, while the first three-model-set uses the measure throughout the sample period 2002-2019, the second has a further time-based restriction to 2015.

Table 12: Politicization, domestic state ownership, and pillar scores

This table reports estimates from regressing Refinitiv ESG pillar scores on domestic state ownership, politicization, their interaction, and control variables. DSO is total domestic state ownership. POL is country-level perceived degree of politicization in nominations of state officials from Hammerschmid (2015). Control variables include log of total assets, price-to-book, return-on-assets, debt-to-equity and total institutional ownership, winsorized yearly at the 2.5th and 97.5th percentiles, and log of GDP per capita. All controls are lagged one year. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	2002-2019, all 16 countries			2015, V-Dem polyarchy > 0.8		
	Env	Soc	Gov	Env	Soc	Gov
DSO	-0.694^{*}	-0.536^{**}	-0.006	-1.669^{***}	-0.821^{*}	-0.589
	(-1.948)	(-2.259)	(-0.018)	(-3.131)	(-1.900)	(-1.205)
POL	5.247^{***}	4.742^{***}	-0.135	6.483^{***}	5.897^{***}	-0.114
	(5.742)	(5.996)	(-0.174)	(4.883)	(5.481)	(-0.093)
DSO x POL	0.200^{**}	0.137^{**}	0.004	0.441^{***}	0.203^{*}	0.134
	(2.459)	(2.440)	(0.054)	(3.423)	(1.943)	(1.130)
Year FE	Yes	Yes	Yes	-	-	-
Industry FE	No	No	Yes	No	No	Yes
Observations	12,345	12,345	12,345	813	813	813
Adjusted R^2	0.293	0.281	0.207	0.294	0.301	0.191

Note: *p<0.1; **p<0.05; ***p<0.01

The results are very similar in the two samples. The joint effect of politicization and domestic state ownership is positive and significant for E and S but not G in both sets of regressions. The magnitude of the estimated effects in the fourth model is illustrated with the following example: if politicization is close to the country median at 4, and state ownership increases by 10%-points, E increases modestly by 0.95. If politicization is at 5, close to the 75th percentile and the level in Austria and Italy, the same 10%-point higher level of domestic state ownership is associated with an environmental pillar that is higher by 5.36. The estimates are somewhat milder for S. These results are generally supportive of my expectation that when there is higher accountability by bureaucrats to (elected) politicians, E and S will be higher.

Anti-corruption, democracy, and domestic state ownership are examined simultaneously in Table 13. CPI is the Corruption Perceptions Index from 0-100 where higher scores indicate less corruption. The results are quite ambiguous, and similarly to Table 7, imply that level of democracy doesn't appear to have strong explanatory power in the shape of state ownership.

In the lowest bracket, anti-corruption and state ownership are unrelated to pillar scores. In the top three brackets, domestic state ownership seems to have a somewhat increasing effect with higher democracy on E and S. With lower levels of corruption, second bracket SOEs have higher pillar scores whereas in the top bracket state-owners' have slightly but significantly higher E and S when corruption is higher too.

In line with my predictions, G seems not to be affected by state ownership in the top democracy bracket. However, the chain from citizens to CSR discussed in Section 2.1.3 fails to explain for example Gov's strong dependence on state ownership and anti-corruption in the second bracket.

Anti-corruption by itself appears unrelated to pillar scores in the bottom three brackets but has a major increasing effect in the top democracy bracket. Countries that score high on democracy but low on anti-corruption include e.g. South American and East European countries.

Table 14 replaces anti-corruption with Strength of Minority Protection Index MPI. Overall, investor protection seems to increase pillar scores with the exception of G in the second bracket, where the coefficient estimate is negative and significant.

Examined jointly with state ownership, effects from minority investor protection get blurry. Domestic state ownership with high protection of minority investors loads positively on pillar scores only in the second bracket. Otherwise the joint effect is mostly insignificant with some exceptions. Similarly, the sole effect of state ownership is blurred by the addition of investor protection to the models.

In the last table of this section (Table 15) are presented the exposures of pillar scores to different types of state ownership by legal origin of countries of incorporation. However, a major caveat is these models is the small number of countries in three of

Table 13: Corruption, domestic state ownership, and pillar scores

This table reports estimates from regressing Refinitiv ESG pillar scores on domestic state ownership, anti-corruption, their interaction, and control variables. Democracy brackets are based on the country of incorporation's V-Dem polyarchy score, lagged one year. DSO is total domestic state ownership. CPI is the Corruption Perceptions Index from 0 to 100 where high scores indicate low corruption. Control variables include log of total assets, price-to-book, return-on-assets, debt-to-equity and total institutional ownership, winsorized yearly at the 2.5th and 97.5th percentiles, and log of GDP per capita. All models include year fixed effects, and models in panel C also industry group fixed effects. The data starts in 2013, as CPI was first available in 2012. All controls are lagged one year. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	Democracy brackets			
	<=0.25	0.25-0.50	0.50-0.75	>0.75
	Panel A: Environmental pillar			
DSO	0.104	−0.241*	0.027	0.617**
	(0.467)	(−1.807)	(0.087)	(2.245)
CPI	0.116	−0.001	−0.028	0.558***
	(0.325)	(−0.005)	(−0.179)	(10.183)
DSO x CPI	0.00002	0.006**	0.001	−0.007*
	(0.005)	(2.450)	(0.087)	(−1.809)
Adjusted R^2	0.171	0.103	0.116	0.347
	Panel B: Social pillar			
DSO	−0.041	−0.162	0.558**	0.650***
	(−0.210)	(−1.123)	(2.533)	(3.168)
CPI	0.272	0.049	0.006	0.264***
	(1.033)	(0.440)	(0.048)	(5.963)
DSO x CPI	0.004	0.006***	−0.010*	−0.008***
	(1.105)	(2.580)	(−1.844)	(−2.610)
Adjusted R^2	0.157	0.167	0.206	0.250
	Panel C: Governance pillar			
DSO	−0.065	−0.348***	−0.577**	0.009
	(−0.290)	(−2.953)	(−2.194)	(0.049)
CPI	−0.142	−0.166*	−0.146	0.225***
	(−0.483)	(−1.673)	(−1.111)	(5.374)
DSO x CPI	0.002	0.009***	0.010*	0.0001
	(0.428)	(4.380)	(1.744)	(0.034)
Adjusted R^2	0.104	0.170	0.136	0.182
Observations	2,546	2,057	3,163	27,981
Countries	11	18	18	38

Note: *p<0.1; **p<0.05; ***p<0.01

Table 14: Investor protection, domestic state ownership, and pillar scores

This table reports estimates from regressing Refinitiv ESG pillar scores on domestic state ownership, minority investor protection, their interaction, and control variables. Democracy brackets are based on the country of incorporation's V-Dem polyarchy score, lagged one year. DSO is total domestic state ownership. MPI is the Strength of Minority Protection Index. Control variables include log of total assets, price-to-book, return-on-assets, debt-to-equity and total institutional ownership, winsorized yearly at the 2.5th and 97.5th percentiles, and log of GDP per capita. All models include year fixed effects, and models in panel C also industry group fixed effects. The data starts in 2014, as MPI was first measured using the current methodology in 2013. All controls are lagged one year. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	Democracy brackets			
	<=0.25	0.25-0.50	0.50-0.75	>0.75
	Panel A: Environmental pillar			
DSO	0.303	−0.421	−0.212	0.445
	(1.614)	(−1.452)	(−0.377)	(0.645)
MPI	1.145***	0.217	0.428**	0.053
	(5.067)	(0.832)	(1.998)	(0.557)
DSO x MPI	−0.008	0.013*	0.007	−0.010
	(−1.352)	(1.685)	(0.463)	(−0.504)
Adjusted R^2	0.208	0.100	0.129	0.346
	Panel B: Social pillar			
DSO	0.603***	−0.680**	0.836*	−0.023
	(3.090)	(−2.477)	(1.924)	(−0.048)
MPI	1.943***	0.351	0.576***	0.059
	(8.956)	(1.534)	(3.200)	(0.756)
DSO x MPI	−0.017***	0.022***	−0.018	0.004
	(−2.634)	(3.196)	(−1.571)	(0.272)
Adjusted R^2	0.292	0.182	0.220	0.246
	Panel C: Governance pillar			
DSO	0.261	−1.027***	0.928*	−0.222
	(1.215)	(−3.980)	(1.909)	(−0.775)
MPI	0.390*	−0.453**	0.279	0.268***
	(1.876)	(−2.063)	(1.642)	(3.592)
DSO x MPI	−0.008	0.030***	−0.031**	0.007
	(−1.220)	(4.453)	(−2.159)	(0.829)
Adjusted R^2	0.101	0.167	0.147	0.185
Observations	2,406	1,822	2,924	25,168
Countries	10	17	17	37

Note: *p<0.1; **p<0.05; ***p<0.01

five subsamples, namely German, Scandinavian, and Socialist legal origin samples. Another issue, as discussed in Section 3.1, is classifications by type of state entity being subject to error. A salient example of these issues materializing is the lack of a coefficient estimate for domestic SWF ownership in Scandinavian legal origin countries as a result of Finnish SWF Solidium being wrongly marked as a government agency and Government Pension Fund Norway[10] largely missing from the data.

In countries with English legal origin, SWFs both domestic and foreign seem to boost ESG scores. Especially governance scores are strongly affected by state ownership, and contrary to other types of ownership, domestic GAs decrease *G*.

In French and Scandinavian legal origin countries, domestic government agencies increase pillar scores. On the other hand, foreign SWF ownership is positively related to pillar scores in German and somewhat also in Scandinavian legal origin countries. Pillar scores in socialist legal origin countries seem unresponsive to state ownership.

5.6 Reporting or 'hard' ESG

In the last section, I present results for baseline difference-differences regressions with nine 'hard' ESG variables and five reporting, transparency, and policy-focused variables in the left-hand-side. Panel A of Table 16 shows how hard variables are affected by state ownership and democracy and Panel B focuses on reporting metrics.

With relation to environmental responsibility of companies, state ownership bears little value in hard variables. Waste recycling ratios of SOEs are in fact lower than POEs'. The joint effect of autocracy and state ownership is only significant for total energy use with a weakly negative effect. SOEs in democratic countries, however, are associated with significantly diligence in ESG and sustainability reporting. Similarly, autocratic country SOEs are significantly less likely to have an emission reduction policy.

Social responsibility is a multifaceted concept covering topics from e.g. health and safety of employees to discrimination prevention and responsible marketing.

[10]Government Pension Fund Norway is not to be confused with Government Pension Fund Global, also known as the Oil Fund. The Oil Fund only has foreign investments.

Table 15: Legal origin, state ownership, and pillar scores

This table reports estimates from regressing Refinitiv ESG pillar scores on state ownership and control variables within subsamples by legal origin. State ownership is classified as domestic and foreign and further split to government agencies (GA) and sovereign wealth funds (SWF). Control variables include log of total assets, price-to-book, return-on-assets, debt-to-equity and total institutional ownership, winsorized yearly at the 2.5th and 97.5th percentiles, and log of GDP per capita. All controls are lagged one year. Panels A and B include country and year fixed effects, and Panel C includes industry group and year fixed effects. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	Legal origin				
	English	French	German	Scandin.	Socialist
	Panel A: Environmental pillar				
Domestic GA	−0.010	0.124**	−0.010	0.192**	0.003
	(−0.218)	(2.101)	(−0.055)	(1.992)	(0.064)
Domestic SWF	0.193***	0.014	−3.698		0.025
	(2.620)	(0.051)	(−1.305)		(0.366)
Foreign GA	0.340	0.011	0.258	0.443	1.309
	(1.184)	(0.079)	(0.172)	(1.513)	(0.872)
Foreign SWF	0.506**	−0.072	0.365	2.033***	0.261
	(2.306)	(−0.438)	(1.371)	(2.820)	(1.012)
Adjusted R^2	0.325	0.375	0.196	0.237	0.256
	Panel B: Social pillar				
Domestic GA	0.073	0.145***	−0.062	0.353***	0.004
	(1.549)	(3.257)	(−0.478)	(4.634)	(0.062)
Domestic SWF	0.170***	0.050	−6.463***		0.040
	(2.931)	(0.212)	(−4.430)		(0.393)
Foreign GA	−0.163	−0.159	0.485	0.595***	−1.508
	(−1.125)	(−1.383)	(0.370)	(3.396)	(−0.897)
Foreign SWF	0.460***	−0.045	0.970***	0.805	0.338
	(3.474)	(−0.385)	(3.592)	(1.409)	(0.835)
Adjusted R^2	0.316	0.363	0.267	0.139	0.062
	Panel C: Governance pillar				
Domestic GA	−0.263***	−0.029	−0.017	0.283***	0.041
	(−4.768)	(−0.638)	(−0.200)	(2.650)	(0.719)
Domestic SWF	0.194***	0.190	−1.829		0.074
	(3.700)	(1.309)	(−0.750)		(0.702)
Foreign GA	0.423**	0.104	2.042***	0.074	−1.125
	(2.207)	(1.297)	(2.963)	(0.276)	(−1.501)
Foreign SWF	0.553**	0.580***	0.822***	0.813	−0.034
	(2.217)	(4.400)	(3.962)	(1.569)	(−0.104)
Adjusted R^2	0.156	0.179	0.261	0.213	0.156
Observations	33,026	6,969	11,018	2,132	3,132
Countries	21	24	6	4	9

Note: *p<0.1; **p<0.05; ***p<0.01

The hard variables I use relate to job opportunities for women and net employment change, and therefore only cover a small part of social responsibility.

The models for share of women employees and share of women managers explain about 40% and 60% of variation in the dependent variables, respectively, despite not including country fixed effects that would capture most cultural effects in overall levels. SOEs are associated with hiring significantly more women managers compared to private counterparts. This finding only holds in democratic countries, in line with Fan et al. (2007). Interestingly, state ownership is associated with a decreased net employment, and a further decrease is documented among autocracy SOEs. A higher probability of having a health and safety policy in place is found for SOEs in democracies and autocracies alike.

In terms of governance metrics, SOEs in democratic countries in fact have more anti-takeover devices than private companies from democracies and SOEs from autocracies. On the contrary, democracy-SOEs also have relatively independent boards. A higher probability of having a shareholder rights policy is documented in SOEs regardless of regime type.

Table 16: State ownership, democracy, and reporting vs. 'hard' variables

This table reports estimates from regressing sets of reporting-related and 'hard' ESG metrics on state ownership and democracy dummies, their interaction, and control variables. SOE is one if at least 5% of shares are owned by state entities and zero otherwise. AUT is one if the V-Dem polyarchy score of the country of incorporation is less than 0.5 (autocracy) and zero otherwise. EU/A and CO_2/A are log of total energy use, and CO_2 emissions divided by total assets. RR is ratio of renewables in energy use. WR is waste recycling ratio. WoM and WoE are share of women among managers and employees, respectively. NE is the net employment change. A-TO is anti-takeover devices above two. IBM is the share of independent board members. SR, HS-P, EM-P, and SH-P are dummy variables indicating if the company published a sustainability report, had a health and safety policy, an emission reduction policy, and a shareholder rights policy, respectively. Scope is the scope of ESG reporting from 0 to 100. All continuous dependent variables are winsorized at the 2.5th and 97.5th percentiles yearly. Control variables include log of total assets, price-to-book, return-on-assets, debt-to-equity and total institutional ownership, winsorized yearly at the 2.5th and 97.5th percentiles, log of GDP per capita, inverse Mills from Model 2, and year and industry group fixed effects. All controls are lagged one year. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	Panel A: 'Hard' ESG variables								
	EU/A	CO_2/A	RR	WR	WoM	WoE	NE	A-TO	IBM
SOE	−0.049	0.063	1.456	−4.026**	1.366**	0.508	−0.946***	0.367***	2.766***
	(−0.734)	(0.931)	(0.653)	(−2.176)	(2.068)	(0.949)	(−2.868)	(4.595)	(2.632)
AUT	−0.065	0.228***	−8.501**	−11.152***	3.798***	4.854***	1.987***	1.585***	−1.158
	(−0.781)	(2.891)	(−2.312)	(−3.914)	(4.093)	(6.971)	(4.936)	(21.158)	(−1.421)
SOE x AUT	0.274*	0.078	−2.392	−2.017	−3.605**	−4.592***	−1.707**	−0.897***	−0.470
	(1.762)	(0.514)	(−0.208)	(−0.382)	(−2.374)	(−3.840)	(−2.379)	(−5.993)	(−0.266)
Observations	22,155	26,083	4,507	13,021	16,079	24,108	50,254	56,008	53,804
Adjusted R^2	0.687	0.669	0.204	0.208	0.395	0.600	0.072	0.430	0.351
	Panel B: Reporting and policy ESG variables								
	SR	Scope	EM-P	HS-P	SH-P				
SOE	0.467***	0.792	0.158	0.371***	0.672***				
	(4.370)	(0.917)	(1.579)	(3.296)	(4.027)				
AUT	−1.082***	4.828***	−1.022***	−0.834***	1.255***				
	(−11.573)	(5.149)	(−10.869)	(−7.984)	(9.923)				
SOE x AUT	−0.645***	−5.262**	−0.401**	−0.251	−0.218				
	(−3.455)	(−2.647)	(−2.207)	(−1.243)	(−0.740)				
Observations	56,430	24,301	56,367	56,147	55,979				
Adjusted R^2		0.089							
Pseudo R^2	0.284		0.276	0.224	0.259				

Note: *p<0.1; **p<0.05; ***p<0.01

6 Robustness checks

In this section, I perform robustness checks by using different data and definitions for SOEs and democracy as well as by dealing with ESG data in alternative ways. I also recreate the baseline model by excluding and separating countries and owners that constitute large parts of the data. Robustness checks are performed for the environmental preferences of government proxy and for changes in state ownership too.

First, I run the baseline Model 1 with alternative definitions of SOEs. With the original data, I use a higher cutoff for state ownership by increasing the minimum amount of shares held by state entities from 5% to 50%. The new cutoff implies dominant control. I also use two other sources of ownership data, namely Datastream and Orbis, with the original 5% cutoff. Datastream reports government holdings that constitute more than 5% of the free float. With Orbis data, I define SOEs based on the global ultimate owner being a state entity as of the end of 2020, or all state entities holding at least 5% of the shares at the end of 2018. I only regress the model on the latest pillar scores in 2019. The mismatch in SOE definition years is caused by data availability. Still, Hsu et al. (2021) note that state ownership is typically quite stable and provide robust results for SOEs' ESG performance using long-lagged ownership data as well. For all three models I redefine the selection equation to create new inverse Mills ratios suitable for these definitions of SOEs.

Results for E are robust to the SOE definition. With Eikon data and a 50% minimum and, and Datastream data and a 5% minimum, estimates of the original SOE effect are very close to those in the original corresponding model. However, the new Eikon and Datastream models produce otherwise similar results with S as well, but the joint effect of SOE and AUT loses its statistical significance. With Orbis data, results are in line with the original data model.

With governance pillar as the dependent variable, results change more. Using a higher cutoff yields a negative overall effect by state ownership, but a countering positive effect by SOEs in autocratic countries. Orbis, on the other hand, produces

Table 17: Robustness check: SOE definition

This table reports estimates from regressing Refinitiv ESG pillar scores on state ownership and democracy dummies, their interaction, and control variables. The table uses varying definitions for SOEs: the first column uses original data but a higher cutoff. The second columns uses Datastream and 5% minimum ownership. In the third column, SOE is one if the global ultimate owner or a controlling shareholder is a state entity at the end of 2020, or if all state-owners have at least 5% of shares in the end of 2018. The mismatch in timing of ownership is caused by data availability. AUT is one if the V-Dem polyarchy score of the country of incorporation is less than 0.5 (autocracy) and zero otherwise. Control variables include log of total assets, price-to-book, return-on-assets, debt-to-equity and total institutional ownership, winsorized yearly at the 2.5th and 97.5th percentiles, log of GDP per capita and inverse Mills adapted from Model 2. All controls are lagged one year. Models in first two columns include year fixed effects, and panel C includes also industry group fixed effects. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	2002-2019		2019
Inform. cutoff:	Eikon, $\geq 50\%$	Datastream, $\geq 5\%$	Orbis, $\geq 5\%$
	Panel A: Environmental pillar		
SOE	3.506^{*}	3.496^{***}	5.584^{***}
	(1.649)	(2.651)	(5.534)
AUT	-15.262^{***}	-16.043^{***}	-10.932^{***}
	(-15.751)	(-16.099)	(-10.251)
SOE x AUT	-6.240^{**}	-7.607^{***}	-9.072^{***}
	(-1.996)	(-3.553)	(-4.841)
Adjusted R^2	0.257	0.270	0.338
	Panel B: Social pillar		
SOE	7.290^{***}	5.309^{***}	4.928^{***}
	(4.449)	(4.884)	(5.717)
AUT	-14.488^{***}	-15.689^{***}	-14.858^{***}
	(-16.396)	(-17.411)	(-16.309)
SOE x AUT	-2.202	-2.870	-5.563^{***}
	(-0.827)	(-1.502)	(-3.475)
Adjusted R^2	0.234	0.254	0.262
	Panel C: Governance pillar		
SOE	-4.365^{**}	0.092	3.150^{***}
	(-2.503)	0.088)	(3.599)
AUT	-3.115^{***}	-3.173^{***}	1.263
	(-3.622)	(-3.575)	(1.343)
SOE x AUT	5.941^{**}	2.546	-4.353^{***}
	(2.362)	(1.431)	(-2.668)
Adjusted R^2	0.134	0.134	0.170
Observations	56,432	56,936	6,916

Note: *p<0.1; **p<0.05; ***p<0.01

opposite results. Datastream estimates align with the original data model.

Overall, the results alleviate concerns of data quality discussed in Section 3.1. Errors do not seem to be systematic as alternative definitions produce qualitatively quite similar outcomes.

Then, I use alternative definitions and data for democracy and accountability of government. Two model types define democracies with lower and higher required cutoffs of V-Dem polyarchy to see if the effects are robust to having even some amount of democratic processes or if results are mostly a product of countries that are highly democratic.

Motivated by the observation of Cheibub et al. (2010) that democracy ratings are not interchangeable and can yield varied results, I use two other definitions or sources of data for government accountability. The first, V-Dem accountability index (Coppedge et al., 2020) measures the extent to which there are constraints on political use of governmental power, normalized to a scale of 0-1.

An alternative data provider, the Economist Intelligence Unit's (EIU) Democracy Index focuses on electoral process and pluralism, functioning of government, political participation, political culture, and civil liberties (The Economist Intelligence Unit, 2020). The EIU classifies countries with an index less than or equal to 6 as *hybrid regimes* or *authoritarian regimes* whereas countries above 6 are *flawed democracies* or *full democracies*. In this specification, I consider countries above 6 as democracies and define autocracies as the opposite. However, again it must be noted that I use the term 'autocracy' for brevity rather than comparing countries just above or below a cutoff as true democracies or autocracies. The EIU data has been constructed for years 2006, 2008, and annually since 2010. For 2007 and 2009, I use observations from the previous year.

Overall, results in Table 18 show that results are quite robust to the definition and source of data for government accountability especially with relation to S and G. On environmental scores, highly democratic countries appear to drive the positive SOE effect. Another finding that the table supports is that autocratic countries

Table 18: Robustness check: democracy data

This table reports estimates from regressing Refinitiv ESG pillar scores on state ownership and democracy dummies, their interaction, and control variables. The table uses varying definitions for democracies and autocracies: the first two columns use original data but different cutoffs. The third column uses V-Dem government accountability index (0-1). The fourth column uses Economist Intelligence Unit Democracy Index (0-10) available from 2006. AUT is one if the index of the country of incorporation is less than or equal to the cutoff (autocracy) and zero otherwise. SOE is one if at least 5% of shares are owned by state entities and zero otherwise. Control variables include log of total assets, price-to-book, return-on-assets, debt-to-equity and total institutional ownership, winsorized yearly at the 2.5th and 97.5th percentiles, log of GDP per capita and inverse Mills from Model 2. All controls are lagged one year. All models include year fixed effects, and models in panel C also industry group fixed effects. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	V-Dem polyarchy		V-Dem accountability	EIU Dem. index
AUT cutoff:	≤ 0.25	≤ 0.75	≤ 0.50	≤ 6
		Panel A: Environmental pillar		
SOE	1.442	5.339***	3.000**	2.290*
	(1.265)	(4.108)	(2.528)	(1.959)
AUT	−17.239***	−15.064***	−16.558***	−17.270***
	(−14.566)	(−13.879)	(−14.248)	(−15.716)
SOE x AUT	−13.758***	−9.514***	−8.633***	−12.420***
	(−5.352)	(−5.200)	(−4.018)	(−5.602)
Adjusted R^2	0.269	0.272	0.274	0.288
		Panel B: Social pillar		
SOE	4.167***	5.981***	4.930***	5.308***
	(4.453)	(5.250)	(4.979)	(5.516)
AUT	−20.747***	−12.157***	−17.904***	−17.692***
	(−20.495)	(−12.578)	(−18.177)	(−19.008)
SOE x AUT	−8.037***	−3.299**	−1.935	−8.469***
	(−3.980)	(−2.061)	(−1.038)	(−4.647)
Adjusted R^2	0.261	0.242	0.259	0.269
		Panel C: Governance pillar		
SOE	1.180	2.038**	1.021	1.059
	(1.344)	(2.040)	(1.098)	(1.174)
AUT	−2.508**	−2.305**	−2.689***	−2.437***
	(−2.324)	(−2.498)	(−2.707)	(−2.684)
SOE x AUT	−0.028	−1.572	1.271	−0.380
	(−0.013)	(−1.047)	(0.720)	(−0.206)
Adjusted R^2	0.134	0.135	0.134	0.140
Observations	56,432	56,432	56,432	51,200
Note:				*p<0.1; **p<0.05; ***p<0.01

as state-owners seem to be more concerned, or less unconcerned, of social than environmental performance: the overall effects of SOEs on E and G are relatively close to each other while the negative joint effect of SOE and authoritarian regime is much more drastic on E. With the V-Dem accountability index, the estimate on S is not statistically different from zero.

In the third robustness check, I omit observations that are potentially systematically downward-biased, and perform logarithmic transformations on pillar scores. In April of 2020, Refinitiv started penalizing companies for lacking in reporting by assigning companies with insufficient data on industry-relevant metrics a pillar score of zero (Refinitiv, 2020). As a result, a considerable share of firm-year observations have environmental scores of zero. I exclude all these observations in one test. The logarithmic transformation is motivated by for example Dyck, Lins, et al. (2019) who use Refinitiv ESG data with natural logarithms. I take the logarithm of $pillar + 1$ due to the above-mentioned pillar scores of zero.

In Table 19, results from pillar score robustness checks are shown. Omitting environmental pillar scores of zero yield very similar results as the corresponding baseline model. However, using natural logarithms of pillar scores instead of raw pillars affects interpretation of E and S models. The overall positive SOE effect on E is positive but statistically insignificant while it was significant at the 1%-level in the corresponding baseline model. Similarly, the sign of SOE x AUT in the S regression remains the same but reduces in significance from the 5%-level to not significant with the logarithmic transformation. The governance pillar score, on the other hand, gets qualitatively similar results as the baseline model produced.

The next robustness check regards specific countries that could be driving the results as major contributors to the data. First, I exclude United States as the largest source of firm-year observations overall and rerun the baseline Model 1. Second, I do the same without South Africa, as the largest amount of firm-year observations of SOEs come from that country.

Table 19: Robustness check: pillar score transformations

This table reports estimates from regressing Refinitiv ESG pillar scores on state ownership and democracy dummies, their interaction, and control variables. In the first column, only firm-year observations where the environmental pillar score is not zero are included. Columns 2-4 take a natural logarithm of $pillar + 1$ as dependent variable. SOE is one if at least 5% of shares are owned by state entities and zero otherwise. AUT is one if the V-Dem polyarchy score of the country of incorporation is less than 0.5 (autocracy) and zero otherwise. Control variables include log of total assets, price-to-book, return-on-assets, debt-to-equity and total institutional ownership, winsorized yearly at the 2.5th and 97.5th percentiles, log of GDP per capita and inverse Mills adapted from Model 2. All controls are lagged one year. All models include year fixed effects and the fourth column also industry group FE. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	Env (only > 0)	log(Env+1) All	log(Soc+1) All	log(Gov+1) All
SOE	3.019***	0.075	0.135***	0.016
	(2.706)	(1.453)	(4.830)	(0.696)
AUT	−14.328***	−0.729***	−0.417***	−0.052**
	(−14.238)	(−13.062)	(−13.082)	(−2.014)
SOE x AUT	−6.671***	−0.372***	−0.065	0.037
	(−3.536)	(−3.320)	(−1.115)	(0.844)
Observations	44,540	56,432	56,432	56,432
Adjusted R^2	0.239	0.224	0.205	0.113
Note:				*p<0.1; **p<0.05; ***p<0.01

I also rerun Models 1 and 3 with the world's largest state-owner, Norway's Government Pension Fund Global (GPFG), as a separate variable. The SWF has data for holdings in nearly 80% of the firm-year observations in the data and is famous for e.g. its exclusion list of companies in which it does not invest for lack of responsibility. Therefore, it not only constitutes a large share of state ownership but may also be a major contributor of high pillar scores. In the first model, I recreate the binary variable for state ownership based on the total amount of shares held by state entities excluding GPFG. In the second model, I subtract GPFG holdings from total foreign SWF shares. I add the fund's holdings as a separate continuous variable in both models.

Excluding United States or South Africa from the data doesn't considerably affect interpretation of the results. The most salient change is the overall effect of SOE

Table 20: Robustness check: major countries and GPFG

This table reports estimates from regressing Refinitiv ESG pillar scores on two kinds of state ownership models. The first three columns use the baseline Model 1. The first and second columns exclude companies from USA and South Africa, respectively. In the third and fourth columns, ownership by Norway's Government Pension Fund Global (GPFG) has been separated as its own continuous variable. The fourth column uses Model 3 with GPFG holdings extracted from the foreign SWF total. SOE is one if at least 5% of shares are owned by state entities (ex-GPFG in column 3) and zero otherwise. AUT is one if the V-Dem polyarchy score of the country of incorporation is less than 0.5 (autocracy) and zero otherwise. Control variables include log of total assets, price-to-book, return-on-assets, debt-to-equity and total institutional ownership, winsorized yearly at the 2.5th and 97.5th percentiles, and log of GDP per capita for all models. Inverse Mills adapted from Model 1 are included in columns 1-3. All controls are lagged one year. All models include year fixed effects, models in the fourth column also country FE (not in panel C), and panel C includes also industry group FE. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

	Country excluded:		Owner separated:	
	USA	S-Africa	GPFG	
	Panel A: Environmental pillar			
SOE	3.920***	4.148***	2.766**	
	(3.204)	(3.198)	(2.144)	
AUT	−14.018***	−15.903***	−14.378***	
	(−13.793)	(−15.386)	(−14.153)	
SOE x AUT	−7.846***	−10.381***	−7.384***	
	(−3.867)	(−4.915)	(−3.526)	
GPFG			4.453***	1.957***
			(9.798)	(5.736)
Foreign SWF				0.039
				(0.293)
Adjusted R^2	0.276	0.281	0.288	0.349
	Panel B: Social pillar			
SOE	5.438***	5.743***	5.085***	
	(5.174)	(5.247)	(4.623)	
AUT	−14.829***	−15.610***	−14.554***	
	(−15.980)	(−16.760)	(−15.864)	
SOE x AUT	−3.152*	−4.327**	−2.361	
	(−1.706)	(−2.287)	(−1.248)	
GPFG			3.224***	1.446***
			(11.402)	(6.246)
Foreign SWF				0.174
				(1.435)
Adjusted R^2	0.272	0.260	0.267	0.347
	Panel C: Governance pillar			
SOE	2.279**	0.124	0.350	
	(2.314)	(0.119)	(0.329)	
AUT	−1.562*	−2.882***	−2.295**	
	(−1.720)	(−3.133)	(−2.536)	
SOE x AUT	1.102	2.141	2.286	
	(0.649)	(1.218)	(1.295)	
GPFG			1.999***	1.863***
			(6.984)	(5.648)
Foreign SWF				0.322**
				(2.454)
Adjusted R^2	0.140	0.136	0.140	0.163
Observations	39,370	55,424	56,432	56,432

Note: *p<0.1; **p<0.05; ***p<0.01

on G in the model with USA excluded turning to positive at the 5%-level. Still, the estimate is smaller than the corresponding effect on E and S.

The models that test the joint effect of state ownership and democracy with GPFG as a separate state entity show that while excluding GPFG from the binary SOE definition doesn't greatly affect interpretation, GPFG itself appears to be a major contributor in all three pillar scores globally. This result is supported by regressions that include types of state ownership as independent variables with the addition of GPFG reducing the positive effect of foreign SWFs to statistically insignificant in two of three cases. When G is the dependent variable, the loading of foreign SWFs is significant at the 5%-level.

I use the Environmental Policy Stringency (EPS) Index (Botta and Koźluk, 2014), applied by e.g. De Haas and Popov (2019) in a working paper for analyzing CO_2 emissions, to proxy for the preferences of government. However, for example Dyck, Lins, et al. (2019) use the Environmental Performance Index (EPI) in a highly similar methodology. They classify institutional owners with a median split on the 2004 value EPI and study pillar scores over the period 2004-2013 with the same classification. In this robustness check, I use the same classification for state-owners based both on EPI and EPS in 2004 in regression models familiar from Table 10 over the period 2004-2019.

The EPI measures environmental health and ecosystem vitality with measures such as access to drinking water, forest loss, and CO_2 per capita. The index has a correlation of 0.65 with EPS in 2004. I use EPS instead of EPI in the main methodology because policy should better proxy for the ruling government's preferences as environmental performance can contain a lot of path dependency, choices by previous governments, and may to some extent be dictated by geographical conditions. It is plausible that governments can adjust policy faster to conform to their preferences than they can affect environmental performance.

Table 21 shows that using EPS in 2004, results are very similar to what was reported in Table 10: state-owners from countries with a high environmental perfor-

mance or policy are associated with a premium in environmental pillars of portfolio companies. The pattern does not seem to be exclusive to domestic holdings. Results are also in accordance with those of Dyck, Lins, et al. (2019) for institutional ownership. It appears that the same dynamics behind ESG implications of institutional ownership apply to state ownership as well. However, when the EPS classification is fixed based on the level of year 2004, the positive association of high-environmental-

Table 21: Robustness check: environmental preferences of government

This table reports estimates from regressing firm-level environmental performance in 2004-2019 on state ownership and control variables. Dependent variable is the Refinitiv Environmental pillar score. State ownership variables are totals of shares held by state entities from countries above or below median of the interest proxy EPS or EPI. EPI is the Environmental Performance Index in 2004, following Dyck, Lins, et al. (2019). EPS is the Environmental Policy Stringency index used in Table 10, as of 2004 as well. Institutions is the percentage of shares held by institutional investors, winsorized yearly at the 2.5th and 97.5th percentiles. Controls variables include log of total assets, price-to-book, return-on-assets and debt-to-equity, winsorized yearly at the 2.5th and 97.5th percentiles, and log of GDP per capita. All controls are lagged one year. All models include country fixed effects. Standard errors are clustered at the firm level. T-statistics are reported in parentheses.

Interest proxy:	EPI 2004		EPS 2004	
	Environmental pillar			
Total above median	0.175***		0.099	
	(4.280)		(1.225)	
Total below median	−0.038		0.055	
	(−0.976)		(1.408)	
Domestic above median		0.160***		0.078
		(3.823)		(0.938)
Domestic below median		−0.051		0.020
		(−1.250)		(0.513)
Foreign states		0.297**		0.435**
		(2.286)		(2.564)
Institutions	0.068***	0.067***	0.067***	0.065***
	(4.854)	(4.797)	(4.782)	(4.501)
Avg. high	2.16%	1.24%	0.70%	0.74%
Avg. low	1.20%	1.07%	2.58%	1.69%
Avg. foreign		1.10%		1.42%
Observations	55,248	53,897	55,248	48,774
Adjusted R^2	0.350	0.352	0.349	0.364
Note:				*p<0.1; **p<0.05; ***p<0.01

preference state-owners loses significance. This may imply that policy of governments in 2004 is not a suitable proxy for preferences of later governments. The (rank) correlation of EPS in 2004 and the latest year with full data, 2012, is (0.60) 0.63. Nevertheless, another possible interpretation, which can coexist with the first one, is that the EPI in 2004 is as good a proxy of government preferences as annual EPS and that environmental performance provides a more stable aggregation of a nation's preferences than policy.

The final robustness check replicates the methodology used to identify trends before and after becoming or ceasing to be an SOE by identifying changes in state ownership of at least five percent independent of the SOE status before the ownership change as treatment. The analysis is again done for increases (purchase) and decreases (sale) of state-controlled shares separately, for each pillar, in democracies and autocracies.

Results on five percent increases in state ownership are mostly consistent with those of becoming and SOE. That is, increases in environmental and social pillars, but not governance, are witnessed in democratic countries alone. For the two time series, the also appear to be pre-trends prior to the acquisition of shares but only for one or two years. Moreover, it is possible that state-owners are able to influence the ESG scores already during the year of the purchase, i.e. from year -1 to year 0.

With relation to sales of at least five percent stakes, there is a considerable difference to results from seizing to be an SOE. Sales of five percent stakes in democratic countries are too associated with increases in environmental and social pillars. However, the increases start later than in the case of purchases, and are of smaller magnitudes as can be seen from E and S already being higher for SOEs than control POEs at year 0. In autocratic countries, no trends are identified.

A weighty finding is the stability of governance scores before and after both types of events. This result provides further robustness for governance being relatively unresponsive to state ownership in both analyzed regime types.

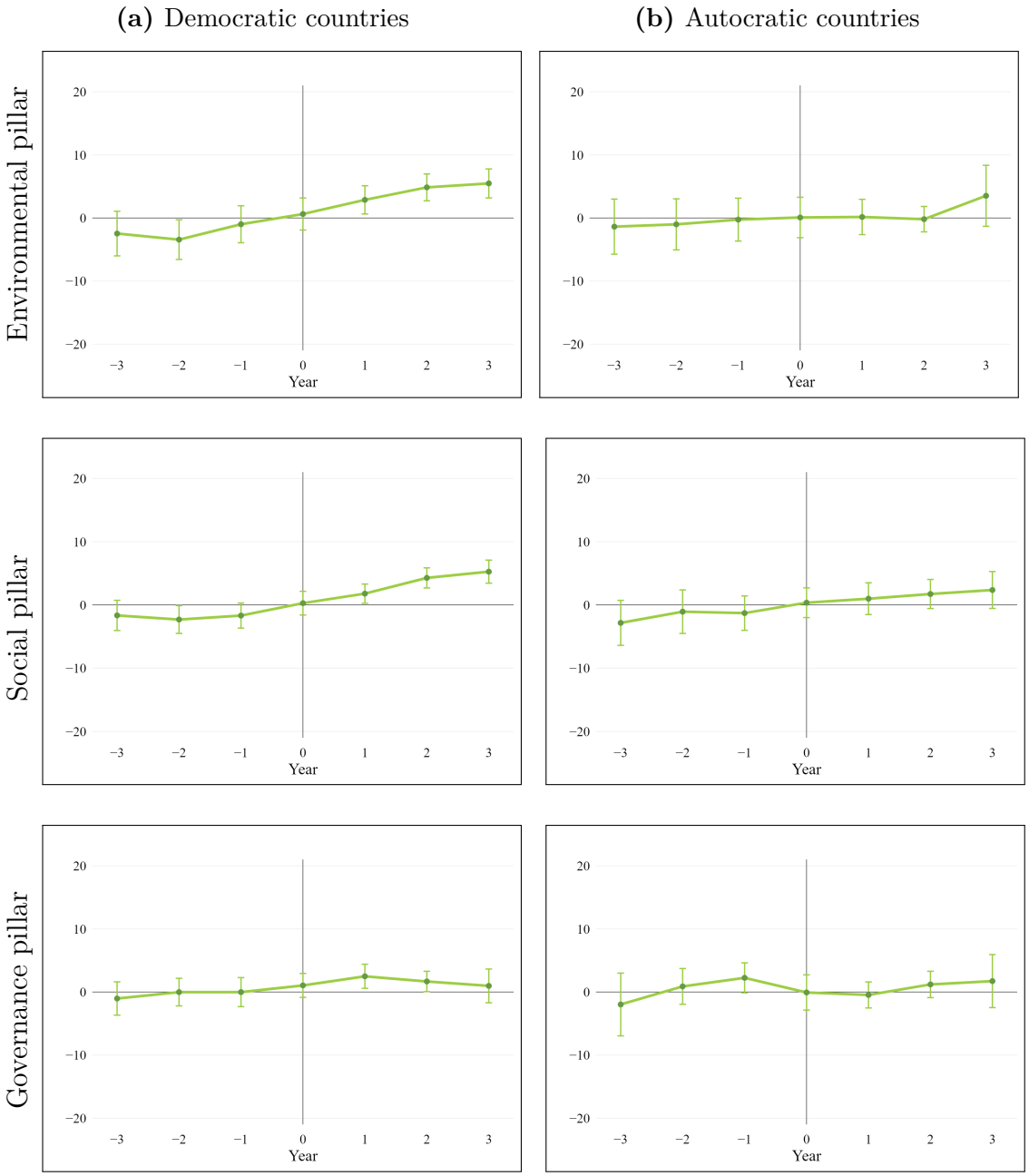

Figure 5: Robustness check: five percent increase in state ownership

This figure reports changes in ESG pillar scores from three years before and three years after a minimum 5% increase in state ownership for treatment and control companies. Democracies are countries whose average V-Dem polyarchy score in 2001-2018 is above 0.5 and autocracies the opposite. The effect is estimated with a difference-in-differences regression with year and firm fixed effects and multiple treatment periods. The control group consists of nearest-neighbour propensity score matched firms for the treatment, with exact matching on country and year. PSM variables include price-to-book, return-on-assets and debt-to-equity, winsorized yearly at the 2.5th and 97.5th percentiles, and industry group fixed effects. Error bars indicate the 95% confidence interval. Year 0 is the year when the company became an SOE.

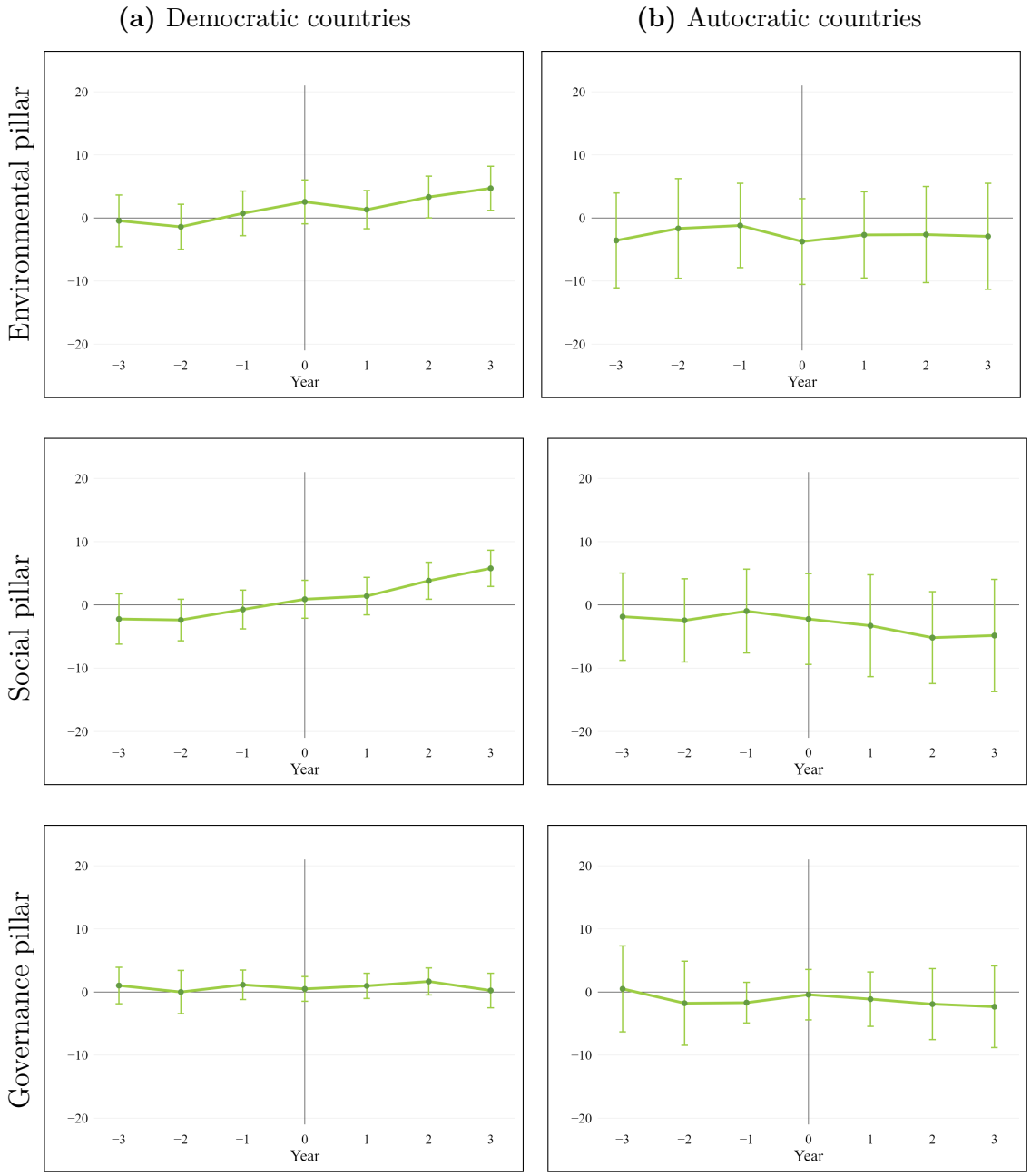

Figure 6: Robustness check: five percent decrease in state ownership

This figure reports changes in ESG pillar scores from three years before and three years after a minimum 5% decrease in state ownership for treatment and control companies. Democracies are countries whose average V-Dem polyarchy score in 2001-2018 is above 0.5 and autocracies the opposite. The effect is estimated with a difference-in-differences regression with year and firm fixed effects and multiple treatment periods. The control group consists of nearest-neighbour propensity score matched firms for the treatment, with exact matching on country and year. PSM variables include price-to-book, return-on-assets and debt-to-equity, winsorized yearly at the 2.5th and 97.5th percentiles, and industry group fixed effects. Error bars indicate the 95% confidence interval. Year 0 is the year when the company ceased to be an SOE.

7 Conclusion

Using differences-in-differences regressions, I document democracy and accountability of government to be positively related with the association between state ownership and corporate social responsibility, two all the more important themes in the financial markets. The positive correlation using environmental and social responsibility as outcome variables is not found for responsibility of governance. Using the same methodology on transparency, reporting and policy-oriented responsibility metrics and 'hard' metrics like renewable energy use separately, I find somewhat weaker effects on the latter category.

On the other hand, democracy does not seem to be a dominant characteristic of the institutional environment in shaping the associations of interest. First, the relationship between state ownership and pillar scores gets confounded when analyzed in four levels of democracy, and when examined jointly with other elements of the institutional environment. Second, while comparing all SOEs to all POEs yields a considerably stronger positive relation with E&S in democracies, by only comparing SOEs with POEs that have otherwise similar characteristics, I find no differences in the relationship by type of regime. The confusion may stem from high correlations among country-level variables of the institutional environment.

Moreover, democratic countries seem to invest in companies that readily present a high level of environmental and social performance: the positive relation between state ownership and pillar scores is weakened substantially when an SOE-selection control is included. Further robustness for this pattern is found by comparing SOEs to a propensity score matched control group – the premium is more than halved, but remains positive for E&S when selection is considered, while governance difference reduces to zero. I also find evidence indicating state ownership to cause more CSR effort using an event study approach: environmental and social pillar scores increase subsequent to becoming an SOE in democratic countries. All three approaches are new to the literature on state ownership and corporate ESG profiles.

Importantly, when governments have expressed an interest in environmental

protection with strict regulation or a net zero carbon target, their SOEs tend to have increased environmental pillars. The same is documented with citizens' environmental values. These results suggest that in addition to institutional investors, such as pension funds, from countries with strong pro-environmental attitudes (Dyck, Lins, et al., 2019), also state-owners project aggregate preferences of their country of origin to portfolio companies. One particularly eminent proponent of responsible investment is the Norwegian SWF Government Pension Fund Global which is associated with premiums in all three pillar scores.

The effectiveness of promoting sustainable business practices through state ownership as a policy tool provides fruitful ground for future research. The question of selection versus causality-driven environmental and social pillar scores as well as implications for minority investors in terms of e.g. share price responses are at the core of measuring welfare effects of state ownership. Similarly, whether the seeming improvements in pillar scores are only a result of increased reporting rather than e.g. use of renewable energy or improvements in working conditions is an important question to answer more thoroughly. In addition, better qualitative understanding of how the state and its representatives use their power and voice as a shareholder as well as the motivational structure of state officials under different regimes and legal environments will enable defining high quality hypotheses regarding modern state ownership.

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A Appendix

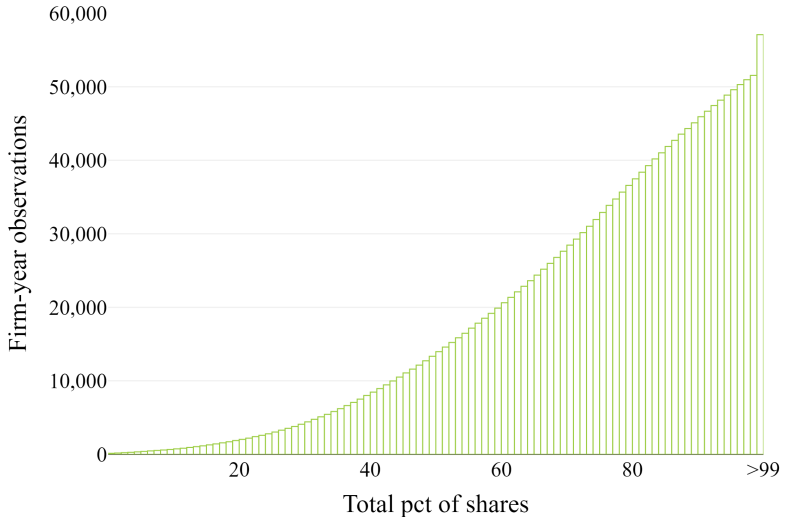
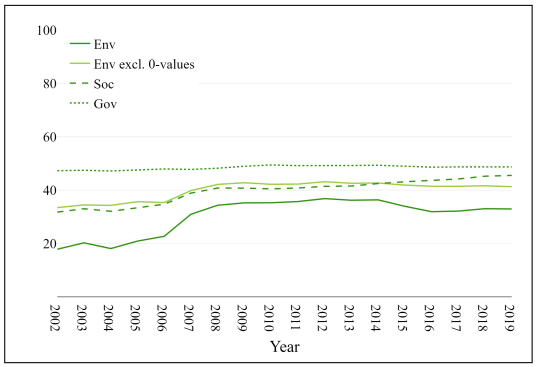


Figure A1: Cumulative frequency of % of shares with owner information

(a) Mean pillar scores, equal-weighted



(b) Mean state ownership, equal-weighted

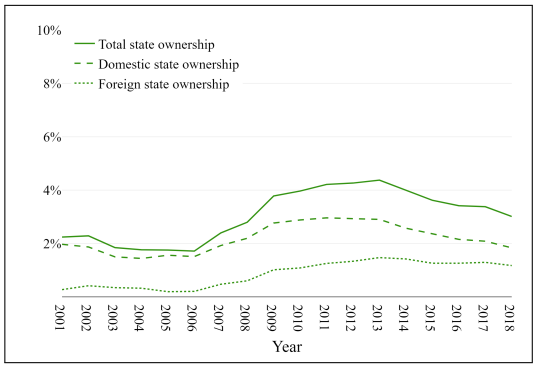


Figure A2: Yearly averages of pillar scores and state ownership

Table A1: Data summary by country

This table presents country-level aggregates for the most important variables in the thesis. Ownership statistics and pillar scores are for firm-year observations. SOEs are defined as state entities holding at least 5% of shares. First year is the first year a company from that country is available in the dataset. Democracy is a firm-year weighted average of the V-Dem polyarchy score of the company's home country.

		State ownership			Pillar scores					Ownership	
Country	Unique firms	Avg. %	SOEs	POEs	Env	Soc	Gov	First year	Democracy	Institutions	% in data
Argentina	39	0.022	5	95	24.7	33.6	49.7	2015	0.773	0.140	0.635
Australia	366	0.013	66	2,918	23.3	36.4	49.9	2002	0.880	0.271	0.485
Austria	31	0.030	19	227	44.4	48.9	50.6	2002	0.861	0.215	0.646
Bahrain	4	0.316	12	5	0.3	13.6	62.1	2015	0.129	0.042	0.506
Belgium	51	0.043	39	382	39.8	42.4	47.7	2002	0.891	0.200	0.580
Brazil	119	0.031	99	715	42.9	52.5	49.3	2005	0.839	0.331	0.699
Cambodia	1	0.008	0	1	73.6	86.7	31.2	2019	0.256	0.093	0.762
Canada	341	0.015	76	2,859	26.4	37.1	49.2	2002	0.851	0.425	0.561
Chile	42	0.004	0	302	32.0	38.6	45.4	2007	0.884	0.179	0.822
China	649	0.039	230	2,170	23.7	26.1	48.2	2002	0.088	0.155	0.694
Colombia	21	0.116	20	110	38.7	53.3	51.2	2009	0.645	0.205	0.868
Cyprus	5	0.005	0	14	51.5	49.2	71.1	2012	0.856	0.145	0.708
Czech Rep.	4	0.228	13	27	31.3	41.8	49.8	2007	0.873	0.159	0.796
Denmark	46	0.017	9	412	38.6	45.7	49.3	2002	0.906	0.306	0.495
Egypt	11	0.122	27	65	9.5	18.7	44.0	2009	0.214	0.068	0.647
Finland	37	0.104	159	231	56.8	54.9	50.1	2002	0.880	0.313	0.549
France	153	0.054	258	1,186	59.1	59.7	49.4	2002	0.878	0.284	0.639
Germany	182	0.024	128	1,248	48.1	54.7	49.7	2002	0.887	0.304	0.596
Greece	26	0.101	70	177	31.6	40.2	47.3	2002	0.892	0.175	0.554
Hong Kong	142	0.020	67	1,255	29.9	35.1	44.9	2002	0.355	0.168	0.694
Hungary	5	0.131	24	20	55.5	61.5	51.1	2008	0.706	0.262	0.676
India	156	0.125	197	781	37.0	51.5	49.4	2007	0.633	0.242	0.777
Indonesia	45	0.191	120	236	30.1	49.4	48.9	2008	0.671	0.110	0.737
Ireland	39	0.041	25	369	36.2	47.7	50.7	2002	0.885	0.631	0.739
Israel	24	0.015	12	165	22.9	40.4	44.1	2002	0.723	0.220	0.593
Italy	98	0.114	184	449	45.4	55.6	50.4	2002	0.864	0.222	0.637
Japan	456	0.011	69	5,818	41.2	33.5	48.1	2002	0.842	0.263	0.456
Jordan	1	0.215	10	0	40.2	52.2	50.0	2009	0.256	0.020	0.535
Kazakhstan	1	1.000	1	0	48.5	64.9	25.0	2019	0.219	0.017	1.000
Kenya	1	0.353	5	0	59.2	36.7	50.0	2015	0.467	0.066	0.819
Kuwait	10	0.203	46	17	16.0	30.9	48.7	2008	0.320	0.022	0.430
Luxembourg	28	0.033	17	92	42.4	52.7	44.2	2004	0.888	0.361	0.778
Malaysia	65	0.191	359	168	30.6	44.1	49.6	2008	0.312	0.139	0.787
Malta	4	0.056	8	9	14.6	20.8	48.8	2012	0.774	0.326	0.619
Mexico	51	0.006	0	318	38.4	46.1	49.3	2006	0.673	0.164	0.594
Morocco	2	0.247	11	11	31.4	45.1	61.6	2007	0.296	0.096	0.852
Netherlands	61	0.025	40	437	48.9	60.8	51.9	2002	0.871	0.367	0.566
New Zealand	52	0.044	29	289	22.3	32.6	49.0	2004	0.878	0.237	0.460
Nigeria	1	0.003	0	6	4.3	35.3	44.4	2013	0.569	0.159	0.255
Norway	54	0.113	86	263	44.9	52.6	50.4	2002	0.892	0.363	0.666
Oman	10	0.250	40	8	6.3	19.2	45.7	2015	0.180	0.039	0.687
Pakistan	5	0.115	2	11	5.9	30.8	45.8	2017	0.424	0.120	0.691
Panama	2	0.007	0	14	20.2	37.3	32.9	2009	0.774	0.767	0.806
Papua N. G.	2	0.120	16	2	23.6	37.4	45.3	2008	0.488	0.263	0.469
Peru	25	0.005	0	87	18.4	29.9	53.6	2010	0.767	0.148	0.718
Philippines	26	0.014	10	213	30.6	39.1	48.5	2008	0.554	0.108	0.686
Poland	42	0.175	109	178	29.0	36.8	48.9	2008	0.837	0.334	0.776
Portugal	15	0.035	12	125	53.5	59.8	52.2	2002	0.889	0.200	0.753
Qatar	17	0.350	78	8	5.3	19.0	47.0	2010	0.088	0.027	0.502
Romania	2	0.013	0	6	11.1	46.8	47.8	2017	0.697	0.183	0.534
Russian	43	0.127	87	259	34.2	36.6	49.7	2007	0.295	0.083	0.683
Saudi Arabia	36	0.363	102	14	14.8	22.7	47.1	2010	0.021	0.021	0.549
Singapore	74	0.162	229	363	27.5	36.6	48.5	2004	0.396	0.190	0.621
Slovenia	1	0.032	1	2	41.6	66.9	50.0	2017	0.847	0.167	0.391
South Africa	118	0.118	816	192	40.4	51.0	51.3	2008	0.734	0.292	0.670
South Korea	148	0.020	77	1,096	42.4	42.9	48.3	2002	0.769	0.232	0.609
Spain	75	0.022	75	559	57.3	66.1	52.0	2002	0.884	0.221	0.635
Sri Lanka	1	0.000	0	5	57.7	51.9	50.0	2011	0.487	0.162	0.236
Sweden	146	0.033	66	906	46.4	55.7	50.1	2002	0.909	0.436	0.613
Switzerland	129	0.037	75	989	41.3	48.7	49.6	2002	0.881	0.303	0.550
Taiwan	152	0.033	179	1,093	35.8	37.0	47.8	2002	0.806	0.187	0.504
Thailand	87	0.090	80	273	42.1	56.3	51.2	2008	0.255	0.128	0.596
Turkey	55	0.086	48	259	41.1	49.4	49.4	2008	0.476	0.121	0.749
Ukraine	1	0.006	0	10	13.2	23.0	43.1	2010	0.468	0.354	0.793
UAE	18	0.350	63	17	17.1	28.1	48.8	2009	0.096	0.096	0.634
UK	396	0.022	291	3,829	40.0	47.9	51.3	2002	0.869	0.641	0.791
USA	2,723	0.008	168	16,894	22.8	41.0	47.7	2002	0.873	0.793	0.882
Uruguay	1	0.013	0	4	53.9	56.9	14.0	2016	0.859	0.758	0.828
Vietnam	3	0.075	1	4	36.5	28.5	48.0	2017	0.215	0.207	0.492

Table A2: Data summary by industry group

This table presents TRBC industry group aggregates for the most important variables in the thesis. Ownership statistics and pillar scores are for firm-year observations. SOEs are defined as state entities holding at least 5% of shares.

		State ownership			Pillar scores			Ownership	
TRBC industry group	Unique firms	Avg %	SOEs	POEs	Env	Soc	Gov	Institutions	% in data
Aerospace & Defense	74	5.14	85	504	37.5	42.2	50.3	60.6	76.7
Automobiles & Auto Parts	172	1.88	72	1,301	41.9	40.5	47.7	36.4	65.1
Banking Services	703	6.94	800	3,673	25.4	42.7	51.1	36.1	62.6
Beverages	77	0.92	7	643	39.7	41.2	50.3	36.3	70.2
Biotechnology & Medical Research	286	0.76	21	859	5.7	44.6	33.6	66.3	80.5
Chemicals	219	3.18	155	1,650	43.4	39.1	51.3	39.9	62.6
Coal	33	8.38	45	206	44.2	42.5	44.4	17.1	70.7
Collective Investments	51	0.07	0	224	16.5	41.7	21.6	45.8	54.0
Communications & Networking	73	0.97	3	405	34.8	47.9	46.8	57.4	72.4
Computers, Phones & Household Electronics	78	1.37	18	541	40.2	43.6	56.6	39.3	59.3
Construction & Engineering	162	2.50	122	1,204	39.1	40.3	45.4	37.1	64.1
Construction Materials	60	2.92	38	437	40.5	39.8	54.9	36.7	68.3
Consumer Goods Conglomerates	50	4.89	65	457	41.5	41.9	52.4	31.3	59.0
Containers & Packaging	44	1.94	35	398	42.0	41.3	52.3	58.0	75.0
Diversified Industrial Goods Wholesale	19	2.36	21	178	40.4	41.4	53.6	28.2	53.5
Diversified Retail	75	1.44	36	643	29.4	41.3	47.9	48.2	75.1
Electric Utilities & IPPs	179	10.29	370	1,210	45.2	44.3	53.2	32.6	64.2
Electronic Equipment & Parts	71	1.28	17	452	33.4	42.7	48.6	51.9	72.1
Financial Technology (Fintech) & Infrastructure	12	1.07	1	54	18.4	44.1	44.9	60.3	76.9
Food & Drug Retailing	116	2.17	87	838	37.1	43.5	50.2	34.7	67.3
Food & Tobacco	255	2.54	164	1,600	39.4	43.2	49.1	36.8	68.9
Freight & Logistics Services	112	3.27	92	795	32.2	42.0	47.1	44.0	68.9
Healthcare Equipment & Supplies	201	1.01	25	1,191	23.0	42.6	47.0	64.5	78.2
Healthcare Providers & Services	101	2.35	49	586	23.8	41.6	52.7	60.7	79.1
Homebuilding & Construction Supplies	103	1.20	15	874	37.9	37.8	47.2	59.2	72.6
Hotels & Entertainment Services	193	1.58	47	1,314	33.0	42.7	43.7	52.5	78.1
Household Goods	40	1.21	7	264	34.6	43.5	47.4	61.0	79.5
Insurance	196	2.38	140	1,651	25.1	44.3	53.0	47.5	68.0
Investment Banking & Investment Services	228	2.43	158	1,536	23.0	43.6	45.5	43.8	67.4
Investment Holding Companies	18	2.94	14	103	24.6	40.2	35.1	31.3	61.7
Leisure Products	46	1.06	6	281	24.0	40.7	46.1	59.7	74.3
Machinery, Tools, Heavy Vehicles, Trains & Ships	386	2.01	155	2,819	38.6	41.5	47.7	49.3	67.5
Media & Publishing	140	1.42	55	1,163	23.6	40.1	43.1	46.6	73.4
Metals & Mining	338	3.15	285	2,497	37.1	37.9	48.8	32.2	61.7
Miscellaneous Educational Service Providers	21	1.33	8	122	14.6	39.5	50.0	72.8	84.3
Multiline Utilities	39	7.93	73	340	40.9	40.4	58.0	38.0	66.1
Natural Gas Utilities	42	6.13	46	246	37.7	42.7	47.2	30.5	65.7
Office Equipment	13	1.02	2	155	38.3	38.7	57.8	39.4	51.1
Oil & Gas	226	6.55	273	1,720	34.7	40.0	53.0	39.6	67.5
Oil & Gas Related Equipment and Services	119	4.48	137	909	32.5	39.2	50.7	55.3	74.5
Paper & Forest Products	43	2.25	43	232	49.4	47.7	57.2	43.4	67.4
Passenger Transportation Services	90	7.25	114	688	35.5	41.5	47.6	36.5	59.6
Personal & Household Products & Services	70	0.99	7	570	33.8	43.2	54.0	49.1	73.4
Pharmaceuticals	228	1.41	38	1,247	34.4	43.4	50.6	42.8	66.0
Professional & Business Education	7	0.99	0	29	27.2	50.6	41.9	54.1	70.1
Professional & Commercial Services	234	1.20	26	1,688	28.7	40.2	50.1	62.2	78.3
Real Estate Operations	260	2.77	114	1,551	32.0	44.1	43.9	28.6	67.7
Renewable Energy	35	1.16	5	187	43.8	47.8	42.5	35.9	68.6
Residential & Commercial REITs	328	2.23	218	1,981	28.8	45.3	46.6	66.3	77.3
Semiconductors & Semiconductor Equipment	156	1.74	80	1,037	39.1	43.5	53.6	55.1	71.4
Software & IT Services	412	1.17	72	2,294	21.4	43.1	44.1	57.8	78.1
Specialty Retailers	181	1.74	92	1,387	27.5	41.4	46.3	58.1	81.4
Telecommunications Services	162	11.61	437	1,081	36.9	44.5	56.1	27.2	67.8
Textiles & Apparel	92	0.99	10	636	32.3	43.1	44.0	42.4	71.7
Transport Infrastructure	70	10.14	120	390	38.0	40.9	48.9	24.6	68.4
Uranium	10	2.19	6	81	29.2	43.0	47.5	31.1	51.7
Water & Related Utilities	28	7.28	34	145	40.5	46.1	51.6	41.7	69.0

Table A3: Data composition by year

This table presents the yearly composition of the data set for companies that have information for at least 10% of ownership in a given year. *Indices added* are the indices whose constituent companies Refinitiv started covering in a given year. Refinitiv collects data also retrospectively, so index additions do not exactly correspond to additions to data. Ownership statistics are lagged one year. SOEs are defined as state entities holding at least 5% of shares.

Year	Firms	SOEs	POEs	Indices added
2002	590	29	561	
2003	594	31	563	SMI, DAX, CAC40, FTSE 100, FTSE 250, S&P 500, NASDAQ 100
2004	1,115	47	1,068	
2005	1,435	61	1,374	
2006	1,498	69	1,429	
2007	1,679	67	1,612	
2008	2,063	109	1,954	DJ STOXX, MSCI World
2009	2,392	150	2,242	S&P/TSX COMPOSITE
2010	2,913	272	2,641	
2011	3,122	317	2,805	Russell 1000, MSCI Emerging Markets
2012	3,284	380	2,904	Bovespa
2013	3,427	412	3,015	S&P ASX 300
2014	3,566	463	3,103	
2015	4,285	508	3,777	
2016	5,105	506	4,599	S&P NSX 50
2017	5,719	557	5,162	Russell 2000, Russell 3000, IPC 35, IPSA 40, MERVAL, COLCAP, PERU GENERAL INDEX
2018	6,535	599	5,936	MSCI Emerging Markets - China
2019	7,110	588	6,522	MSCI Europe Small & Mid Cap Index

Table A4: Data summary by state ownership status

This table presents aggregates for relevant variables in the thesis for state-owned enterprises and privately-owned (public) enterprises. SOEs are defined as state entities holding at least 5% of shares and POEs as the opposite. *Env*, *Soc*, and *Gov* are pillar scores. Institutions and Total available are the percentages of shares held by institutions and for which there is ownership data available, respectively. Investor protection and anti-corruption are not available for all countries and therefore consist of less observations. Variables marked with (w) are winsorized yearly at the 2.5th and the 97.5th percentiles.

	Panel A: All companies							
	All observations				Year 2018 (2019 for pillars)			
	SOEs	POEs	Difference	p-value	SOEs	POEs	Difference	p-value
Observations	5,165	51,267			588	6,522		
Env	43.4	31.6	11.8***	<0.001	46.1	31.8	14.3***	<0.001
Soc	51.2	41.2	10.0***	<0.001	56.4	44.6	11.8***	<0.001
Gov	53.4	48.3	5.1***	<0.001	54.1	48.2	5.9***	<0.001
Institutions (w)	25.4	47.0	-21.6***	<0.001	29.0	48.0	-18.9***	<0.001
Total available (w)	68.1	69.5	-1.5***	<0.001	70.7	73.9	-3.1***	<0.001
V-Dem polyarchy	0.65	0.80	-0.15***	<0.001	0.59	0.74	-0.15***	<0.001
Investor protection	35.9	34.9	1.0***	<0.001	36.3	35.1	1.2***	<0.001
Anti-corruption	57.5	69.3	-11.9***	<0.001	57.9	67.3	-9.5***	<0.001
Log(GDP/capita)	9.8	10.5	-0.7***	<0.001	9.9	10.5	-0.6***	<0.001
Total assets m$ (w)	35,688	20,034	15,655***	<0.001	26,165	12,290	13,876***	<0.001
Return-on-assets (w)	5.53	5.22	0.30***	0.003	4.35	3.40	0.95**	0.014
Debt-to-equity (w)	113.8	98.8	15.0***	<0.001	110.1	90.2	19.9***	<0.001
Price-to-book (w)	2.21	2.84	-0.64***	<0.001	2.03	2.81	-0.77***	<0.001
	Panel B: Companies by democracy environment							
	Democracies				Autocracies			
	SOEs	POEs	Difference	p-value	SOEs	POEs	Difference	p-value
Observations	3,682	46,458			1,483	4,809		
Env	49.4	32.1	17.3***	<0.001	28.4	26.9	1.5**	0.033
Soc	56.3	42.2	14.1***	<0.001	38.6	31.8	6.8***	<0.001
Gov	54.0	48.4	5.6***	<0.001	51.6	46.7	4.9***	<0.001
Institutions (w)	30.6	50.3	-19.7***	<0.001	12.4	15.1	-2.7***	<0.001
Total available (w)	68.1	69.7	-1.6***	<0.001	68.0	68.0	0.0	0.993
V-Dem polyarchy	0.81	0.85	-0.04***	<0.001	0.24	0.22	0.02***	<0.001
Investor protection	36.3	35.0	1.2***	<0.001	35.0	33.9	1.1***	<0.001
Anti-corruption	60.1	71.8	-11.7***	<0.001	51.4	49.5	2.0***	<0.001
Log(GDP/capita)	9.8	10.6	-0.7***	<0.001	9.6	9.5	0.1***	<0.001
Total assets m$ (w)	36,616	19,875	16,741***	<0.001	33,386	21,567	11,819***	<0.001
Return-on-assets (w)	5.38	5.06	0.31**	0.011	5.90	6.78	-0.87***	<0.001
Debt-to-equity (w)	116.1	99.4	16.7***	<0.001	108.0	92.9	15.2***	<0.001
Price-to-book (w)	2.16	2.87	-0.71***	<0.001	2.32	2.59	-0.27***	<0.001